AVIATION WEEK
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JUNE 8, 1953
50 CENTS

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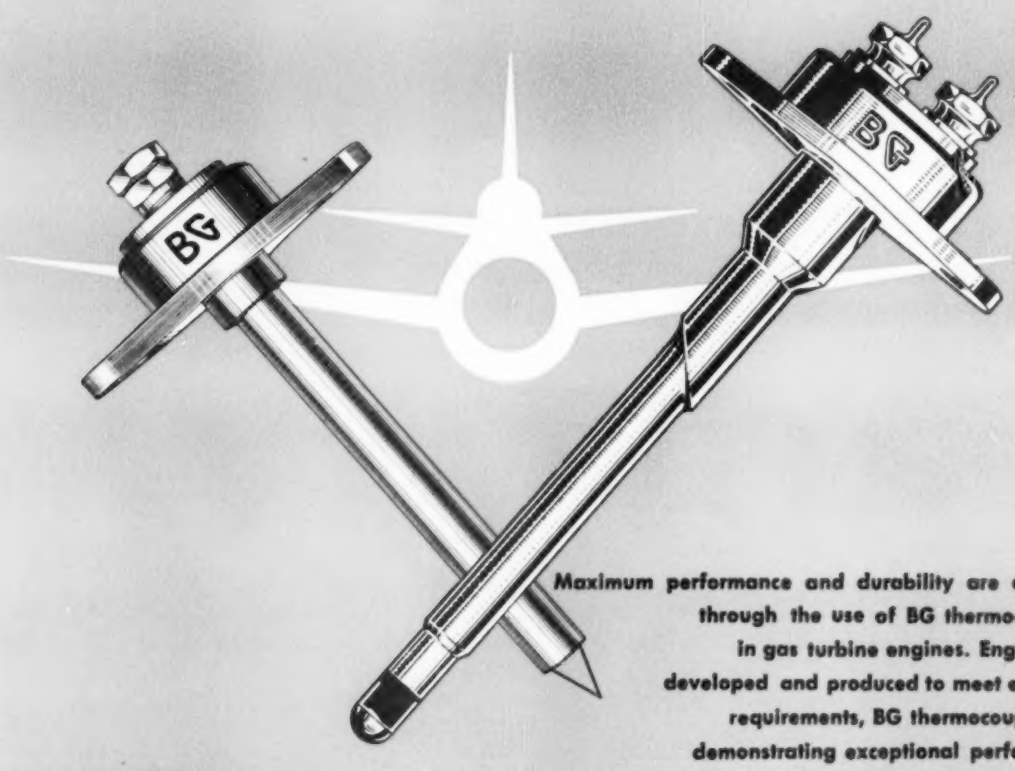

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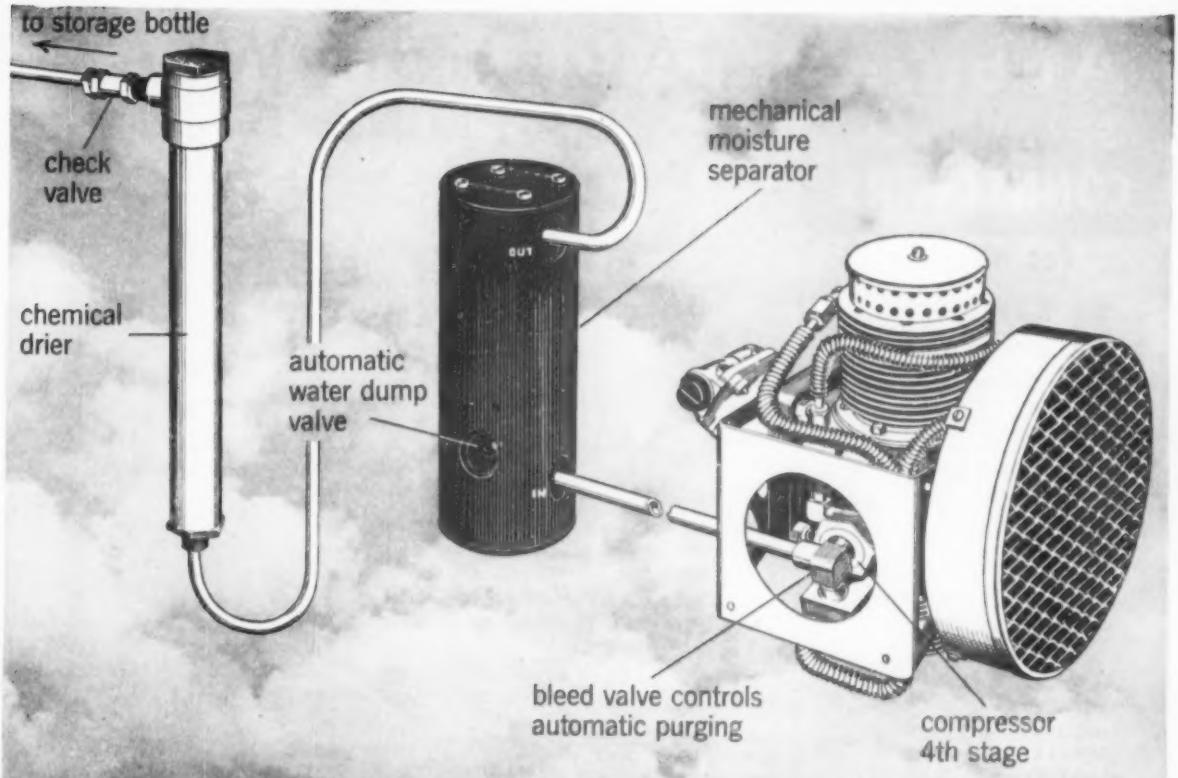

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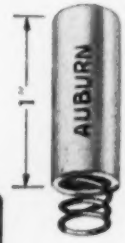

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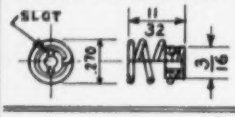

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Aviation Week

Volume 58 — June 8, 1953 — Number 23

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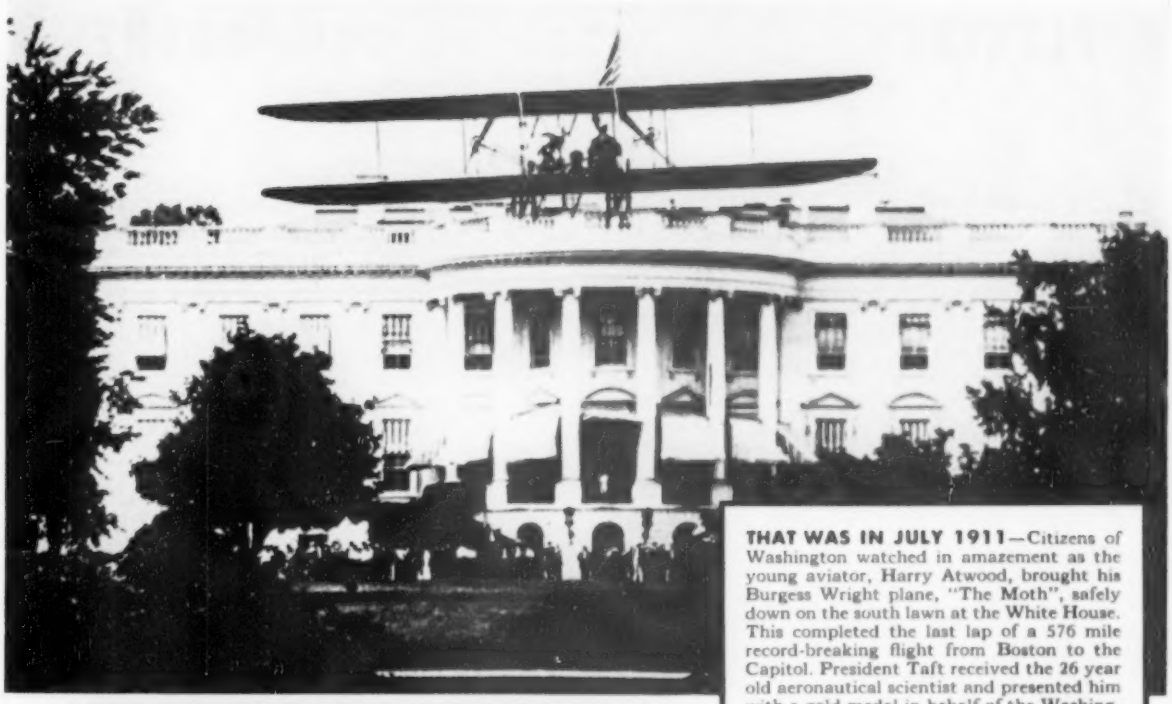
Atwood lands at the White House!



THAT WAS IN JULY 1911—Citizens of Washington watched in amazement as the young aviator, Harry Atwood, brought his Burgess Wright plane, "The Moth", safely down on the south lawn at the White House. This completed the last lap of a 576 mile record-breaking flight from Boston to the Capitol. President Taft received the 26 year old aeronautical scientist and presented him with a gold medal in behalf of the Washington Aero Club. Today, Harry Atwood is still active in scientific development, particularly in plastics and electronics.

SAME SETTING—FORTY YEARS LATER—Aviation is today so much a part of our everyday lives that a giant Boeing B-29 in from Tokyo can fly over Washington and go virtually unnoticed by the people below.

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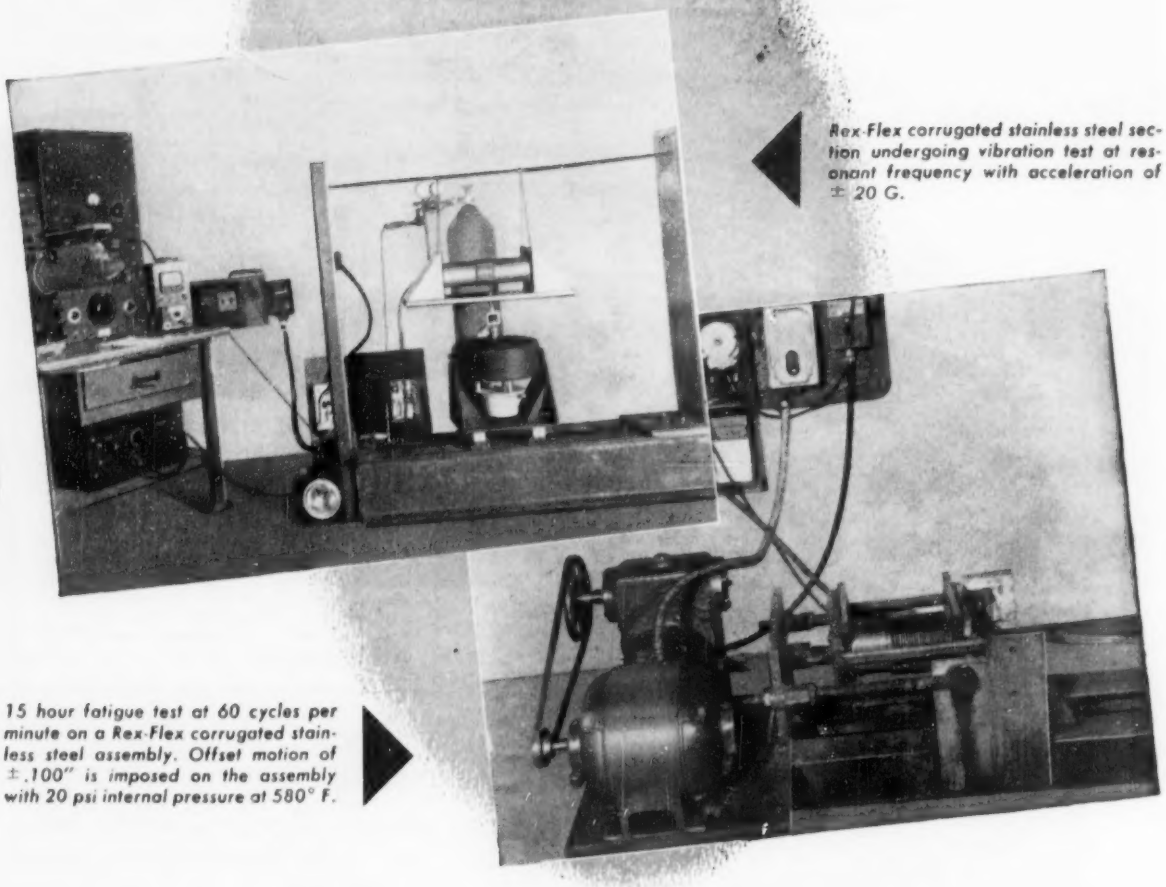

Rex-Flex corrugated stainless steel section undergoing vibration test at resonant frequency with acceleration of ± 20 G.

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NEWS DIGEST

Vandenberg Warns Against AF Cutback

General Hoyt S. Vandenberg last week told the Senate Appropriations Committee that there is no sound military reason why the Air Force buildup to 143-wing level again is to be delayed.

"Rather than reduce our efforts to attain air superiority over the Communists, we should now increase these efforts."

Gen. Vandenberg warned that a manpower ceiling placed on USAF means that the Air Force will fly fewer hours next year with a greater number of wings than it is flying this year. This means a reduction in maintenance standards and in flying skill and experience, he says.

The Air Force Chief of Staff stated emphatically that neither he nor the Air Force has approved the interim goal of 120 wings.

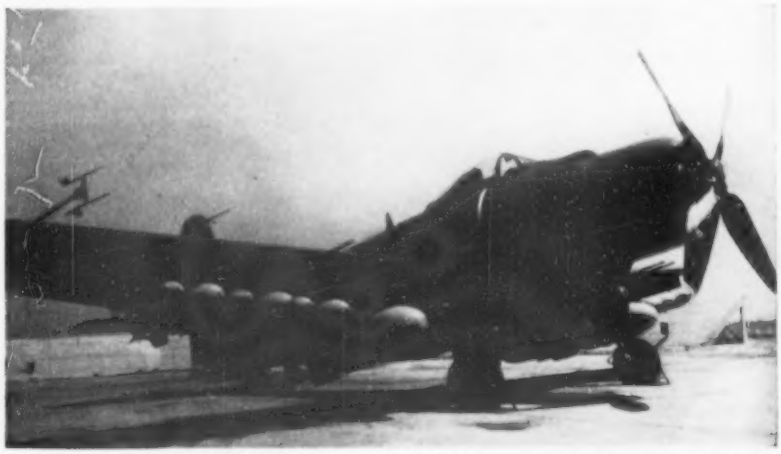
"As recently as March 1953 the Joint Chiefs of Staff stated to the Secretary of Defense that any reduction of the program of 143 wings to be attained as soon as practicable after fiscal year 1954 would reduce the risk of national security beyond the dictates of national prudence.

"Six months ago our program of expansion and modernization was progressing in an orderly manner and there was no reason to doubt that we could attain 143 modern wings before December 1955."

Earlier, Air Force Secretary Harold E. Talbott told the committee the revised Eisenhower budget still is scheduled to equip 143 wings. This is to be accomplished, he declared, by postponing the obligation of substantial funds beyond June 30, 1954, to fiscal 1955. Talbott concurred with Sen. Dennis Chavez when the New Mexico Democrat said: "You will need a lot more money in 1955 fiscal year, and what you are going to do then is to make up what you take off in fiscal year 1954." Talbott criticized the Truman budget for the Air Force as unrealistic in its lead times. For example, he said, a lead time in the Truman budget for a specific Pratt & Whitney engine is allowed as two years. Yet, he testified, he had conferred with P&WA officials, who said the actual lead time is only 10 months.

Domestic

Fairchild Engine Division, Farmingdale, N. Y., has received new military contracts totaling $6 million for its 1,000 lb. thrust J44 turbojet engine and additional V-32 auxiliary powerplants, the latter from USAF for installation in long-range bombers. The V-32 award comprises roughly half the total new business. The J44 now is in production for AF, Navy and Army.



DOUGLAS AD-4B SKYRAIDER is believed to have set a new load-carrying mark for single-engine planes when it recently took off fitted with a useful load of 11,944 lb., greater than its basic weight of 11,798 lb. It is shown here with three 2,000-lb., six 250-lb. and six 500-lb. bombs. Additional weight was in guns, ammo, fuel etc., bringing total up to 14,941 lb. The AD-4B is a "special weapons" version of the Skyraider. Fixed armament consists of four 20-mm. cannon, two in each wing.

Pilot pay increases of from $20 to $100 a month have been signed by Air Line Pilots Assn. with Braniff, Trans World and United Air Lines. Negotiations are in progress or slated to start this month between ALPA and Eastern, Panagra, Trans-Texas, Alaska, Delta-C&S, Lake Central and Pioneer.

Lt. Gen. Glenn O. Barcus, former commander of the Fifth Air Force in Korea, has been named vice commander of the Air Training Command, relieving Maj. Gen. Kenneth McNaughton, who will go to Tokyo as vice commander of the Far East Air Force.

Maj. Gen. William H. Tunner, former deputy commander of the Air Materiel Command, has been appointed vice commander of USAF in Europe with headquarters at Wiesbaden. He will be succeeded at AMC by Maj. Gen. William McKee, former USAF Assistant Vice Chief of Staff.

Air Force Historical Foundation has been established as a non-profit organization. Gen Carl A. Spaatz (Ret.) is president. Membership will be open to the public.

Braniff Airways gradually is rehiring union mechanics who were fired after they walked off the job Apr. 6 at Dallas to protest dismissal of an apprentice and re-assignment of a maintenance crew chief. **President T. E. Braniff** says 400 of 650 members of the Air Carrier Mechanics Assn. (AFL) who staged the walkout have asked for re-employment.

Shortage of skilled workers in U. S. aviation is being overcome through on-the-job training of an estimated 27,000 persons in 86 plants, Aircraft Industries Assn. reports.

Sydney D. Mahan, 58, director of public relations and advertising for Jack & Heintz, Inc., Cleveland, died May 22 at Chagrin Falls, Ohio.

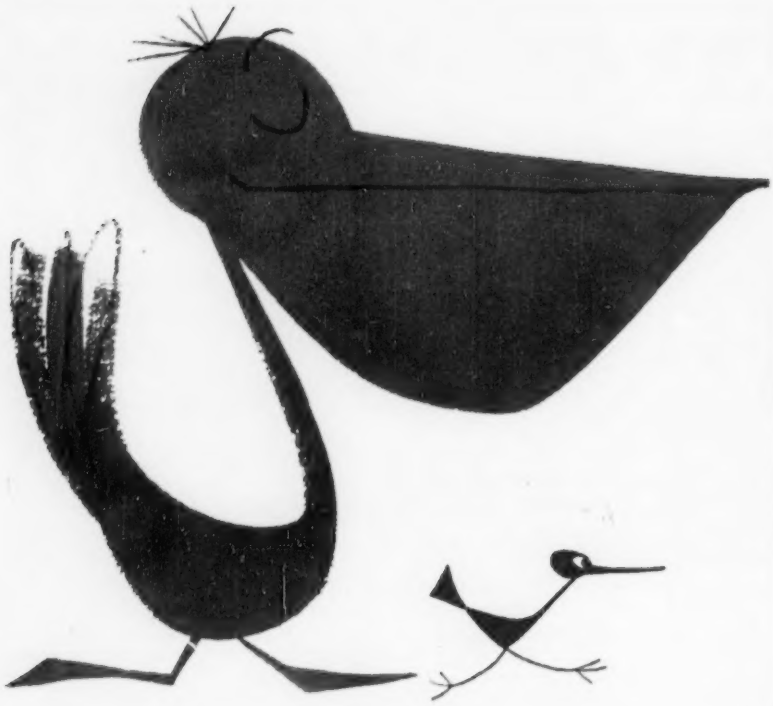
Financial

Allegheny Airlines reports the first April profit of its history—$4,776.

Trans Caribbean Airways has declared a dividend of 5 cents per share on Class A stock and a 5% dividend on Class A and B shares.

International

First of two Comet 1As ordered by the Royal Canadian Air Force landed May 29 at Ottawa, completing the first trans-Atlantic flight of a jet transport. Second Comet is scheduled to arrive in Ottawa June 15. RCAF has scheduled the jet liners for familiarization flights.



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The Aviation Week

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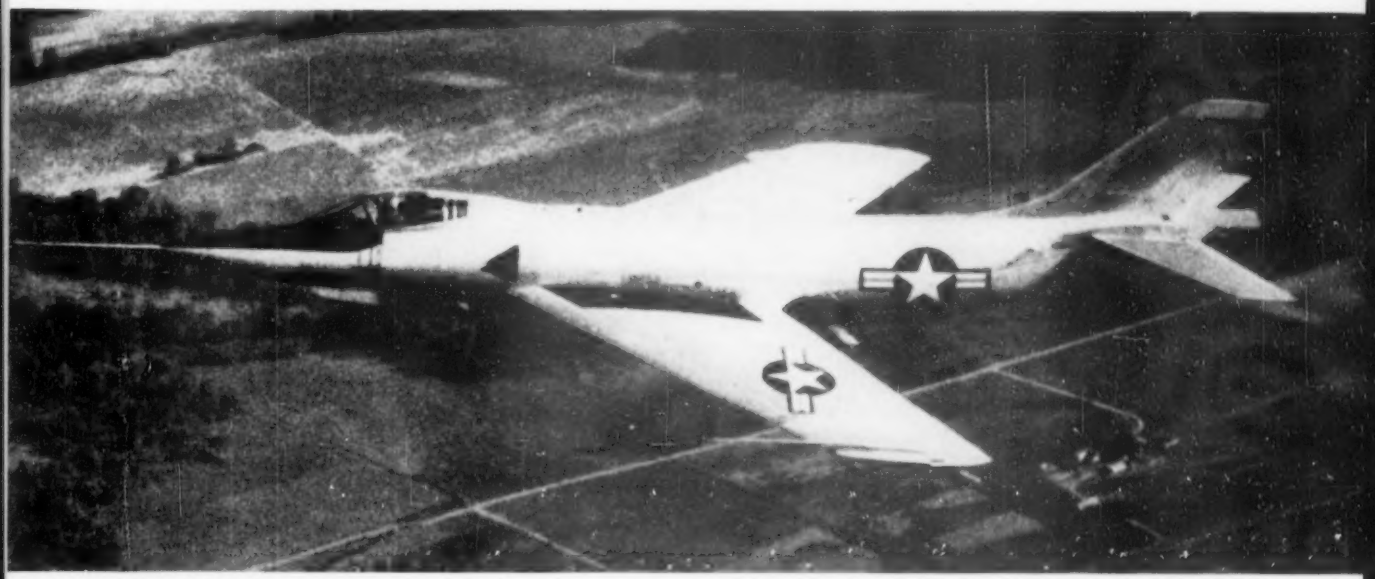
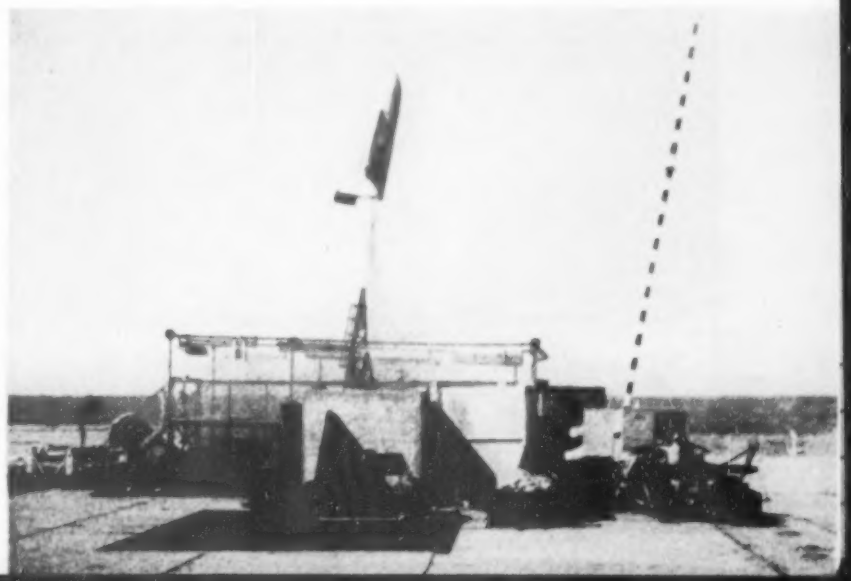
McDONNELL TRIES OUT DEMON—First unretouched photos of McDonnell XF3H-1 Demon carrier-based Navy jet fighter (above and below) show some detail blotted out by censors in earlier pictures. Note the large intake, previously concealed, for the Westinghouse J40 engine. In the above takeoff view, the plane's "droop snoot" leading edge is extended and the variable-angle tail has its leading edge well down.



DEMON ALOFT—Flight view of XF3H-1 shows craft's sharply swept wings, also flat section behind the tail which maintains airflow continuity. Navy has ordered a quantity of Demons from McDonnell Aircraft Corp., St. Louis, Mo., and the plane will also be built by Temco, Dallas, Tex. The prototype is to undergo carrier suitability trials at the Navy Test Center at Patuxent, Md. and production deliveries are to begin before the end of this year.

New Wings In the Air



TEST FAIREY VTO—First action view, from movie film, of a Fairey VTO (vertical takeoff) model aircraft taking off at rocket range, Woomera, Australia. The Fairey VTO is fitted with a delta wing and is powered by a Fairey Beta 1 engine having two 900-lb.-thrust motors. Two 600-lb. booster rockets assist the model's takeoff. The striped pole at the right is used in determining initial acceleration.

INDUSTRY OBSERVER

► Chance Vought faces another delay on equipping its F7U-3 Cutlass twin-jet Navy fighters with Westinghouse J46 engines specified for the plane. Recently installed in some Cutlasses, the powerplant has shown an overspeed condition at altitude, necessitating grounding of the aircraft. Cutlass trials were made prior to completion of engine acceptance trials. New target date for acceptance of the J46 is late July. Chance Vought has been flying F7U-3s powered by Allison J35 engines.

► **Industry sources say United Aircraft Corp.'s agreement to let Navy use the Pratt & Whitney J57 engine with afterburner (heretofore exclusively an Air Force engine) had a bearing on the final decision to award Navy's day fighter contract to Chance Vought Division of UAC, using the J57 afterburner powerplant.**

► A two-fold modification program for improved bailout procedures from jet fighters has been recommended by USAF Directorate of Flight Safety Research. It involves a method of ejecting the pilot through the canopy in event it does not unlatch and an automatic timing device for separating the pilot from his seat and opening his chute after a free fall to a predetermined minimum altitude. Recommendation asks for refitting current fighters and equipping new ones with the safety equipment.

► **Air Rescue Service expects to get delivery soon of its first Piasecki H-21 tandem-rotor rescue helicopter, now undergoing cold-weather tests at the Air Proving Ground, Eglin AFB, Fla.**

► Complications of starting an R1830 engine for Arctic operations in Alaska at −50F, as described by the USAF, involve the following procedures: It may be necessary to preheat the engine for as much as an hour with an engine-driven, gasoline-burning heater. But if the heater is kept outdoors, it will not start until it is preheated by a smaller gasoline heater of the hand crank-blower type. To fire up the hand crank heater, USAF mechanics use cigarette lighters, making a four-step procedure before the airplane engine will start.

► **Grumman Aircraft Engineering Corp. has contracted for flight test of the first Sarah (search and rescue and homing) radar beacon sets that Simmonds Aerocessories will make in this country. The 47-oz. transmitter-receiver beacon emits a homing distress signal that rescue planes 10,000 ft. above and 66 mi. away can pick up. The downed pilot can talk a rescue plane down when it gets in voice range. The device was developed by Ultra Electric, Ltd., in England, and licensed to Simmonds.**

► Unofficial competition between Navy and Air Force jets will get a different twist at the Detroit International Aviation Exposition, July 9-12, when Navy's sweptwing Grumman F9F-6 Cougar and Air Force's F-86 Sabre jet make daily sprints from Kitty Hawk, N. C., to Detroit.

► **Cornell Aeronautical Laboratory backlog has reached an all-time high of $14 million and is still rising, according to Dr. T. P. Wright, laboratory director and vice president of Cornell University. Staff is expected to expand to 1,000.**

► General Motors Corp. had 11 of its executive airplane fleet at Southwest Airmotive Corp., Dallas, Tex., recently while GM officials attended opening of the Motorama of 1953. The planes included six DC-3s, three Lodestars, one Lockheed PV-1 and a Beech 18.

► **Latest service contribution to approach light confusion is a composite system Navy has installed at Patuxent River, Md., Naval Air Test Center, which combines crossbar, slopeline and centerline lights.**

► Designers looking for small turbines for fixed-wing airplanes say that current military trends in development are aimed primarily at helicopters, with large-diameter turbines and inlet designs not suitable for conventional planes. The large diameter means large frontal area, more drag.

WHO'S WHERE

In the Front Office

David S. Wyse has been named president of Associated Technical Sales Co., Dayton, Ohio, recently formed sales and service agency for aircraft equipment and hydraulic firms.

Donald S. Wood is new executive vice president and manager of Automotive and Aircraft Parts Manufacturers' Assn. of Canada, Toronto.

Hugh F. Colvin has been promoted to vice president and general manager of Consolidated Engineering Corp., Pasadena, Calif. **Robert L. Smallman** has been elected vice president-sales, and **Victor Pollock** is new treasurer.

Howard D. Neal has been named vice president and general manager of Aerol Co., Inc., Los Angeles, Calif.

James Cain has been appointed assistant to the president of Durham Aircraft Service, Inc., Woodside, N. Y. **Charles F. Ward, Jr.,** is new sales manager.

Changes

Harold R. Boyer, manager Cleveland Cadillac plant of General Motors Corp., and **Charles Luckman,** Pereira & Luckman, Los Angeles, have been elected directors of Lear, Inc., Grand Rapids, Mich.

Cyrus S. Collins is new assistant vice president of Pan American-Grace Airways.

A. W. Morgan has been named acting general manufacturing manager of Consolidated Vultee Aircraft Corp.'s San Diego Division.

Arthur S. Iberall has been appointed director of the new research and development department of Aro Equipment Corp.'s Aircraft Division, Cleveland.

Harold F. Howard has been promoted to assistant group executive in charge of overall direction and coordination of Ford Motor Co.'s Aircraft Engine Division, Chicago.

W. E. Heyne has joined Hussmann Aircraft Division, St. Louis, as T-36 administrator.

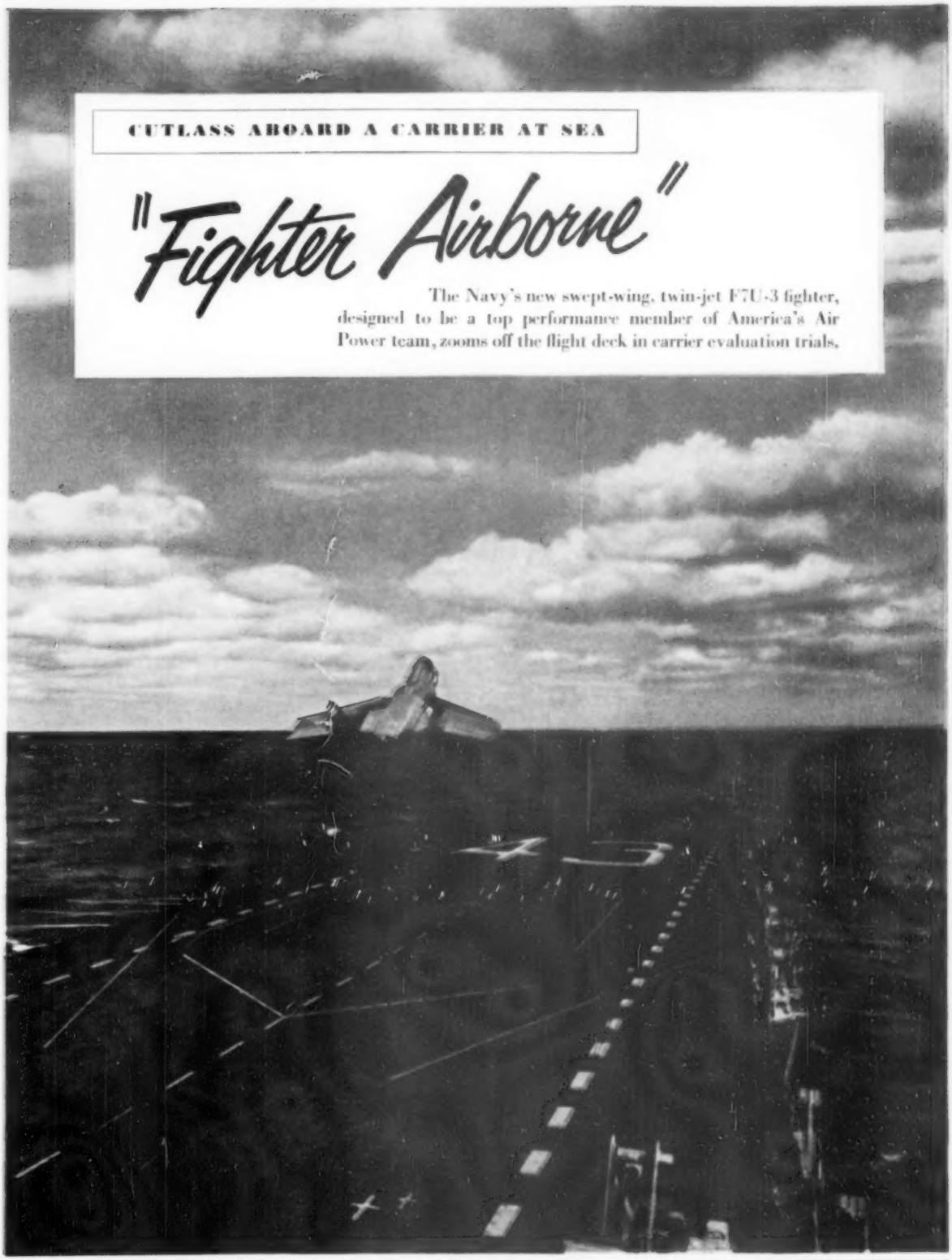
Edward J. Connors is new advertising and sales promotion manager of Standard-Thomson Corp., Dayton. Other changes: **C. W. Bondurant,** chief engineer, and **John Eriksson,** plant works manager.

Ronald Peel has been promoted to supervisor of ground training for Trans-Canada Air Lines. **D. H. Gray** has been appointed director of maintenance and overhaul.

Honors and Elections

James S. Cobb, vice president-public relations of Delta-C&S Air Lines, has been elected chairman of Air Transport Assn.'s public relations advisory committee. **Willis Player,** vice president-public relations of Northwest Orient Airlines, is vice chairman.

Robert J. Hartlieb, Jr., Lebanon, Pa.; **Saul Feldman** and **David M. Benenson,** both of Los Angeles, have been awarded Guggenheim jet propulsion fellowships for study at California Institute of Technology.


CUTLASS ABOARD A CARRIER AT SEA
"Fighter Airborne"
The Navy's new swept-wing, twin-jet F7U-3 fighter, designed to be a top performance member of America's Air Power team, zooms off the flight deck in carrier evaluation trials.

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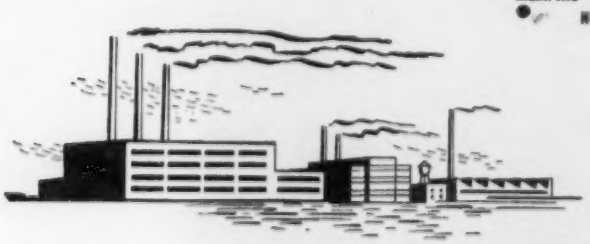

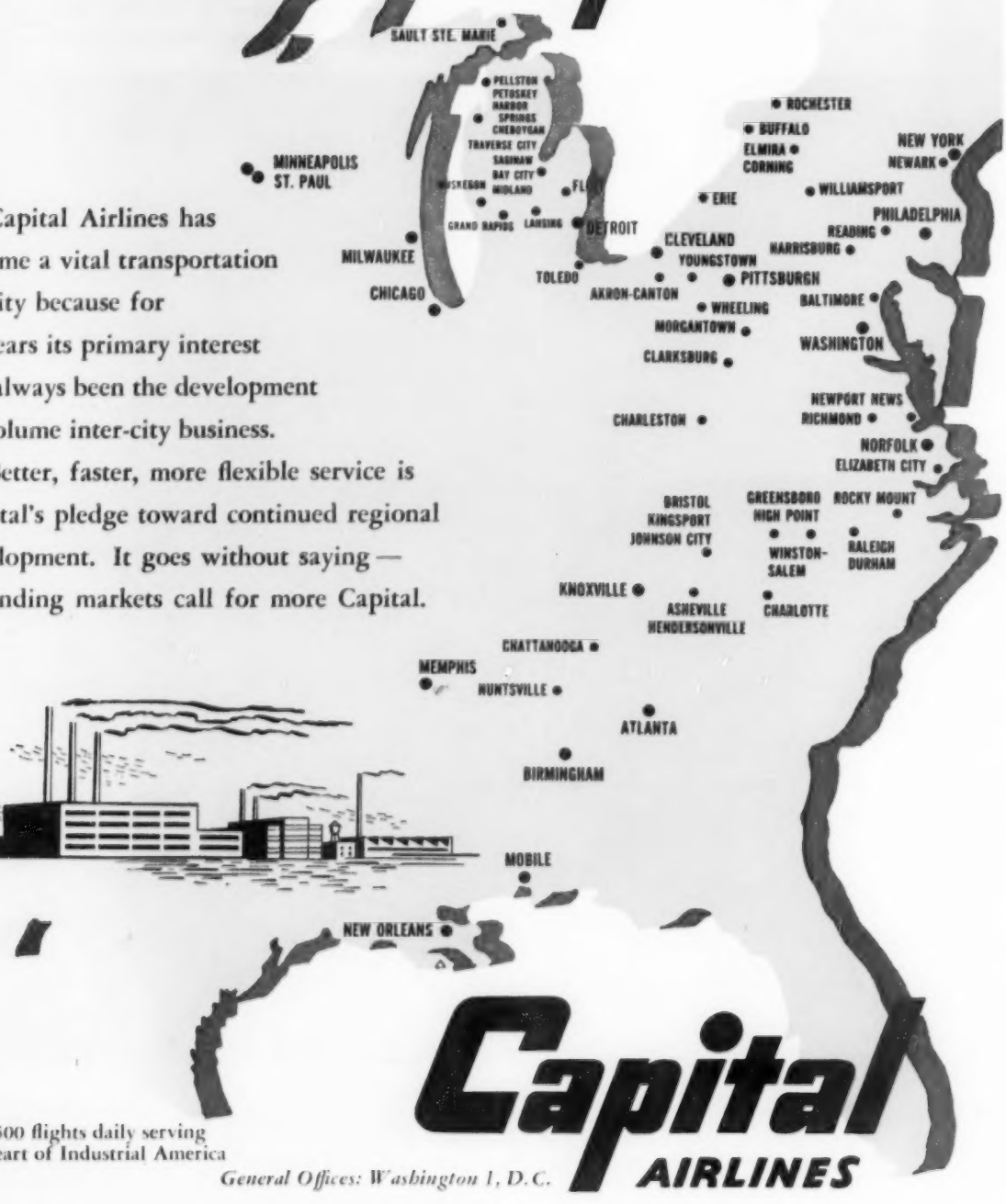

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Washington Roundup

Planes and Tax Cuts

Increasing Republican pressure to hold defense spending in fiscal 1954 even lower than the $43.2 billion set by the President appears certain to develop over the coming months.

Despite the Administration's economy efforts, total government expenditures for fiscal 1954 will mount to $73.6 billion—$6.1 billion more than estimated revenues of $67.5 billion. The President wants to narrow the deficit gap by $1 billion by postponing reductions in excess profits, corporate, and excise taxes. But Congress shows no sign of going along.

Efforts will be made for further reduction in civilian and foreign aid spending. But these aren't likely to close the $6.1-billion gap.

It is becoming apparent that a balanced fiscal 1954 budget, paving the way for tax reductions next spring for fiscal 1955, which starts July 1, 1954, can be accomplished only by clamping down further on the big area of government spending—defense outlays. The aircraft procurement program undoubtedly would be a prime target, simply because it is by far the biggest single item of defense spending.

Air Force Program: 1955

Top Defense Department officials are holding out the prospect that new money for aircraft will turn upward in fiscal 1955.

They explain that in fiscal 1954 they want a "breathing spell" to review the roles and missions of the services, as well as aircraft production programs. Instead of gradual year-by-year decline to a level-off, as contemplated in the 143-wing program of the Truman Administration, they say, new money for planes is taking a sharp dip in 1954 under their program and will probably rise in the following year.

New Military Chiefs

The new Joint Chiefs of Staff start off on the stormy road ahead with a firm approval from Congress. Senate Armed Services Committee unanimously voted their confirmation:

Adm. Arthur Radford, new chairman of JCS, who four years ago spearheaded the "revolt of the admirals" against USAF's B-36 program, surprised senators by an unhesitant and unqualified endorsement of strategic bombing.

"Strategic air is one of the most important arms of our national defense," Radford testified, "I believe we must have a very efficient and powerful Strategic Air Command in the Air Force." Specifically, he endorsed development of the hydrogen bomb and the B-52, successor to the B-36. His next likely congressional role: witness on the Administration's $5-billion slash in USAF money in the fiscal 1954 budget.

Gen. Matthew Ridgway and Adm. Robert Carney, new Army Chief of Staff and Chief of Naval Operations, respectively, are being quoted by the congressional opposition to the Administration's air power budget cuts. In their former NATO commands, both repeatedly pointed to the need for more air power for the European Theater. A few weeks back, Ridgway, speaking as NATO commander, told the House Foreign Affairs Committee: "Air power is still the weakest link in our defense. Despite the substantial gains in numbers of aircraft and trained pilots . . . our air forces today are still inadequate to carry out their assigned tasks."

Gen. Nathan Twining, new Air Force Chief of Staff, under questioning, expressed the first public and official Air Force opposition to the Administration's reduction in the USAF budget and the lowering of the goal from 143 wings to 120 wings.

Admiral McNeil

The reputation of Assistant Secretary of Defense Wilfred McNeil as an impartial career official is a target in the current air power controversy. Air Force proponents credit him with being the key man in selling the steep $5-billion slash in 1954 USAF funds to the top Pentagon command. They say McNeil, a rear admiral in World War II and top budget man at the Defense Department since 1949, has perennially concentrated on USAF in paring budgets.

Widespread criticism of McNeil for being anti-USAF only recently has come to the surface. Pro-USAF spokesmen point out that McNeil, a Democrat appointee, also wrote the "more defense for less money" script for Defense Secretary Louis Johnson when USAF was cut in 1948.

McNeil also was an active proponent of an even split of the defense dollar between the services when he worked for the late James Forrestal in the Defense Department. Some Democrats are chuckling over the fact that the most controversial program to emerge onto Capitol Hill from the Eisenhower Administration is primarily the work of a Democrat appointee.

Tempest in Congress

Evidence that the Air Force is on the outside looking in on the Wilson-Kyes defense program is causing concern on Capitol Hill.

USAF's incoming chief, Gen. Twining, testified that he was not consulted on USAF's coming-year budget—which provides for the program he will have responsibility for. The role of USAF's outgoing chief, Gen. Hoyt Vandenberg, has set off a tempest.

Defense Secretary Charles Wilson, under persistent questioning, reluctantly told one Senate committee that Vandenberg was consulted on the USAF budget "to the extent he was available." Undersecretary Roger Kyes elaborated that Vandenberg "has never been refused the opportunity to talk, if he had anything to say," and pointed out that he was present when the final defense budget was presented to the National Security Council.

But former Secretary for Air, Sen. Stuart Symington, resented "the implication that Gen. Vandenberg lacks the courage of his convictions." He told another Senate committee that Vandenberg knew of the revised USAF budget only "a few hours" before it was presented to the NSC, and, as only a military adviser, it would have been "insubordinate" for him to volunteer opposition to the Secretary of Defense.

Sen. Margaret Chase Smith continued the tempest by pointedly asking the new members of JCS, as they appeared for confirmation, if they would speak up before the NSC "if the national security were involved." Each said he would.

—Katherine Johnsen

AVIATION WEEK

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Defense Sets New Rules for Plane Buying

- **Late deliveries by manufacturers will result in dropping tardy aircraft from production program, Wilson says.**
- **Backlogs are to be reduced sharply, inventories pared by 30%, which will mean less long-range U.S. financing.**

By Robert Hotz

Leaders of the aircraft industry were hastily summoned to Washington last week to receive a new set of ground rules for doing business with the Republican regime in the Defense Department.

Main points made by Defense Secretary Charles E. Wilson and USAF Secretary Harold E. Talbott in a brusque presentation at a Pentagon luncheon meeting were:

• **Manufacturers who fail to meet** Pentagon specified aircraft delivery schedules will be penalized by having the tardy aircraft dropped from the production program. Wilson and Talbott made it clear that the manufacturers would be held responsible for tardy deliveries of their aircraft for any reason whatsoever even if it involved failure of component manufacturers to supply equipment.

• **Backlogs of the aircraft industry** will be sharply reduced by a new Pentagon policy of cutting aircraft financing from the 36- to 60-month periods now used to 18 months or less. Wilson told the aircraft leaders that he felt previous Pentagon policy of scheduling and financing aircraft production from three to five years in advance was dangerous and wasteful.

• **Industry inventories** will be reduced by about 30%. Wilson said he felt that the high inventories now maintained by aircraft firms were too large for current production requirements and the Defense Department would no longer aid in financing large inventories.

These new Pentagon policies were expected to create major financial and production problems in the aircraft industry. They were outlined at a meeting last Tuesday afternoon that was convened by Talbott at less than 24 hours notice.

▶ **Industry Stunned**—Immediate reaction of the industry leaders was stunned silence. At the end of the meeting Wilson and Talbott paused to allow industry comment but there was none. Undersecretary of Defense Roger Kyes announced that any later industry comment on the meeting should be made by the Aircraft Industries Assn. After the luncheon meeting broke up, individual aircraft company presidents were briefed in private by USAF Assistant Secretary Roger Lewis.

Coming less than two weeks after the AIA board of governors meeting at Williamsburg, Va., when Wilson and Talbott assured the industry it had "nothing to worry about," the sudden Pentagon meeting last week gave the industry a jolting, realistic view of the Detroit automobile-manufacturing philosophy it now faces in the Pentagon.

Industry representatives attending:

Joseph McNarney, president of Convair; J. H. "Dutch" Kindelberger, chairman of the board of North American Aviation Inc.; Robert Gross, president of Lockheed Aircraft; Donald Douglas, Sr. and Jr., president and vice president of Douglas Aircraft; Oliver Echols, chairman of the board of Northrop; William Allen, president of Boeing; J. H. McDonnell, president of McDonnell Aircraft; L. L. Brahbam, vice president Republic Aviation Inc.; George Bunker, president of the Glenn L. Martin Co.; Richard Boutelle, president of the Fairchild Engine and Airplane Co.; H. M. Horner, president of United Aircraft Corp.; William P. Gwinn, general manager of Pratt & Whitney Aircraft; Roy Hurley, president of the Curtiss-Wright Corp.; Ralph Cordiner, president and C. W. LaPierre, general manager of the General Electric Co. Gas Turbine Division; Edward Newhill, general manager of the Allison-Aeroproducts Division of General Motors Corp., and Dewitt C. Ramsey, president of the Aircraft Industries Assn.

In addition to Wilson, Talbott, Kyes and Lewis, the Defense Department was represented by James Douglas, USAF Undersecretary; Lieut. Gen. Thomas White, Vice Chief of Staff USAF; Lieut. Gen. Orval Cook, Deputy USAF Chief of Staff for Materiel; Charles Thomas, Undersecretary of the Navy; Rear Adm. Thomas Combs, chief of the Navy Bureau of Aeronautics, and W. J. McNeil, Assistant Secretary of Defense.

U. S. Air Power

(To be financed by fiscal 1954 appropriations)

	(Planes to be bought) Truman Budget	Wilson Cut	New Budget
USAF	3,500	1,150	2,350
Navy	2,000	700	1,300
Total	**5,500**	**1,850**	**3,650**

Source: Fiscal 1954 budget and McNeil Memo.

USAF Program*

(Targets for June 1954)

	Truman budget	Wilson budget
Combat wings	116	102
Troop carrier wings	17	12
Total	**133**	**114**
(Target for June 1955)		
Combat wing	120	106
Troop carrier wing	17	14
Total	**137**	**120****
(Target for June 1956)		
Combat wing	126	106
Troop carrier wing	17	14
Total	**143**	**120**

* *Source: McNeil Memo.*

** *Plus 23 Reserve and National Guard wings with modern aircraft.*

Among the other items Wilson and Talbott told the industry were:

• **The B-47 Stratojet program** will be slashed by about 200 aircraft. Intent of the Wilson regime to cut the B-47 program was forecast in AVIATION WEEK Apr. 13 p. 13. Defense Department still officially claims no combat aircraft are being cut from the production program. They have designated the 200 B-47s to be eliminated as "trainers" because they were to be used by three Strategic Air Command wings devoted to operational training of SAC crews.

• **Total of 1,150** allegedly "non-combat" aircraft will be cut from the USAF program. Among the hardest hit will be the Chase C-123 assault transport, the Lockheed T-33 jet trainer, the Beech T-36 twin-engine trainer and helicopters and liaison planes.

• **Reason industry backlogs** will be cut by the new Defense Department policy. It reduces the re-order lead time to 18 months or less from its present 36- to

22-month interval. Defense Department bases the new 18-month re-order cycle on Navy planning schedules. Navy Bureau of Aeronautics says that although its schedule operates on an 18-month plan, it still takes at least 22 months to get an aircraft delivered. This is for the fighter and light-bomber-type aircraft in the Navy production schedules. There is nothing comparable to the Air Force's B-47 or B-52 medium and heavy jet bombers where lead time actually is running up to 24 months.

• **Reversal of an earlier Wilson statement** that the B-52 would not go into heavy production for some time "until all the bugs were out" in favor of more-than-a-billion-dollar commitment to order several hundred B-52 bombers for SAC. At present, an estimated 70 RB-52A photo-reconnaissance versions of the Boeing bomber are on order.

• **No absolute ceiling will be imposed** on USAF spending in fiscal 1954. The announced ceiling of $15 billion will be handled flexibly enough to accommodate additional deliveries of aircraft if industry production exceeds current Pentagon estimates. It will be necessary to postpone deliveries of aircraft if industry production exceeds current Pentagon estimates. It will not be necessary to postpone deliveries during fiscal 1954 because of lack of funds.

• **USAF expects** to get 2,300 more aircraft during fiscal 1954 than were delivered in fiscal 1953. These aircraft will be paid for out of funds appropriated in previous years.

Defense Department said 75 more combat aircraft would be delievered to USAF between July 1953 and December 1955 under the Wilson budget than were scheduled under the Truman budget. USAF sources say there is no support for this statement in any USAF program now under consideration.

The Wilson budget also contemplates achieving some additional economy by diverting aircraft from the regular Air Force program to equip 23 Reserve and National Guard wings. Cost of maintaining these units is considerably less than a regular USAF wing.

▶ **Basis for Slash**—Ironically, the aircraft conference was called several days after a detailed memorandum on Wilson's aircraft program had been given to the Pentagon press corps by Defense Undersecretary Roger Kyes. The memorandum originally was prepared by the office of W. J. McNeil for Maj. Gen. Wilton Persons, President Eisenhower's congressional liaison officer. It was drawn up in an effort to persuade recalcitrant Republicans to back the new defense budget and accept a $5-billion cut in USAF appropriations for fiscal 1954.

The memorandum confirmed AVIATION WEEK's analysis (June 1, p. 13) that the slash in AF and Navy air power based on:

• **Accumulation** of unspent procurement funds from previous years.

• **Major slippage** of aircraft production.

• **Elimination of** transports, helicopters, trainers and liaison planes.

• **Theoretical reduction in lead time** cutting the financing period for aircraft production.

▶ **Slippages**—The McNeil memorandum cited the following production slippages as typical of what has happened in USAF procurement:

• **Boeing B-52 Stratofortress:** four months.

• **Martin B-57A Canberra:** six months.

• **Republic F-84F Thunderstreak:** four months.

• **Beech T-36 twin engine trainer:** eight months.

Industry sources say production slippages still are prevalent almost across the board when measured by USAF and Navy schedules, that total slippage would be the equivalent of nearly a year's aircraft production.

▶ **Lead Times**—The McNeil memorandum listed the following lead times scheduled by USAF:

• **Boeing B-47 Stratojet:** 26 months.

• **Lockheed T-33 jet trainer:** 23 months.

• **McDonnell F-101 long-range jet fighter:** 26 months.

• **North American F-100 jet interceptor:** 25 months.

The memo says these lead times are "much too long, particularly on items that have long been in production like the B-47 and T-33." It states that lead time on the B-47 and most other planes can be cut to 18 months. In a detailed explanation of this philosophy of reducing lead time by Pentagon edict, the memo says:

"Programs will be adjusted to reflect more realistic lead times. At present time a relatively simple trainer aircraft is programmed for the same lead time as a medium jet bomber. Aircraft lead time can be reduced to 18 months or less, resulting in lower unit costs.

▶ **Industry Problems**—Industry sources predicted that the Pentagon's attempts to shorten the financing gap in aircraft production would produce some serious financial and production problems within the industry. Few companies within the industry are equipped to finance their forward production without considerable assistance from their military customers via partial payments.

The longest lead time items for aircraft, such as fire control equipment, landing gears and electronics equipment, still are running at about 24 months. Industry sources say the Pentagon may order aircraft with an 18-month lead time schedule, but this will do nothing to speed up manufacture of such critical components and so reduce actual lead time.

Another basic clash between aircraft manufacturing methods and the Detroit automobile manufacturing philosophy was noted by industry observers in Roger Kyes' recent speech before the Inland Press Assn. at Chicago in which he criticized aircraft production because:

"Much research and development spilled into production resulting in numerous costly engineering change orders to correct deficiencies that were direct the result of insufficient proofing or testing."

▶ **The Industry View**—These observers point out that it is the constant "spilling of research and development into the production line" that insures a constant output of high-quality aircraft instead of the rapid obsolescence rate that comes from freezing production on a certain model to get quantity output at the expense of quality.

Industry observers point out that automobile manufacturers had had little experience with aircraft development problems and have done their main work in mass producing equipment already developed by aircraft manufacturers. They cite the Sabre jet development from the F-86As produced in 1949-50, which were inferior to the MiG-15 in performance, to the F-86F of 1952 now shooting down MiGs at a record rate in Korea. This is an example of the combat payoff of the aircraft manufacturers' philosophy. The increase in performance and combat capability from the B-36A of 1948 to the B-36F and H of 1952 is another example.

There is still a good deal of confusion in both the Pentagon and the Capitol on what the Wilson fiscal 1954 defense budget really involves. Part of this confusion results from the fact that virtually all of the basic decisions have been made within the Office of the Secretary of Defense without consultation with the military chiefs of the three services involved. Thus, figures released by the Defense Department often do not jibe with those available from individual services.

Navy Aircraft Budget Is Cut $834,134,000

Top Navy brass testifying on Capitol Hill last week indicated they would accept a $1.7-billion slash in fiscal 1954 appropriations without protest.

The cut includes a reduction in Navy aircraft procurement request of $834,134,000, equivalent of 700 combat aircraft. The Truman budget request of $2,234,134,000 would have financed 2,000 new aircraft out of fiscal 1954 funds. The Wilson budget of $1.4 billion for aircraft procurement will buy 1,300 planes.

The McNeil memo indicated the

First Quarter Aircraft Backlog

(All figures in millions)

	Backlog Dec. 31	Net new orders	Net sales	Backlog Mar. 31
Complete aircraft, parts	$11,222	$2,006	$1,224	$12,004
For U.S. military	10,386	1,902	1,104	11,184
Other	836	104	120	820
Aircraft engines & parts	5,172	712	570	5,314
For U.S. military	4,992	677	531	5,138
Other	180	35	39	176
Aircraft propellers & parts	298	51	44	305
For U.S. military	267	46	37	276
Other	31	5	7	29
Other product & services	961	104	186	879
Total	$17,653	$2,873	$2,024	$18,502

Aircraft Backlog $18.5 Billion

Backlogged aircraft orders reached $18.5 billion by the end of the first quarter of 1953.

A joint report issued by Census Bureau and Civil Aeronautics Administration reveals the total backlog of 50 manufacturers increased 5% over the final quarter of 1952 and 35% over last year's first quarter.

Orders for complete aircraft and parts made up 65% of the total. Since the previous quarter, complete aircraft orders were up 7%. Backlog for engines and parts showed a 3% increase over unfilled orders for the final quarter of 1952 and made up 29% of the total. Propellers and parts made up 2% of the total backlog and climbed 2% higher than the previous quarter.

Military orders comprised 93% of the aircraft backlog, 97% of engine orders and 90% of the propeller backlog.

New orders received during the year, 16% of the backlog at the end of the quarter, were valued at $2,873 million. In complete aircraft and parts, new orders were 64% higher than sales. Value of new orders for engines and parts was 25% greater than sales and orders for props and parts were 16% higher.

Navy would take a total reduction in plane strength of 200 planes in 1954 and 500 planes in 1955 but that all would come from support units—maintaining combat strength at 16 carrier air groups, 15 anti-submarine squadrons, 34 patrol squadrons and three Marine air wings.

Modernization of Navy combat aircraft will continue at a reduced rate with 100 fewer new planes scheduled for delivery in 1954 and 300 less in 1955. Despite these reductions scheduled under the Wilson budget, the Navy will get 800 more combat planes next year than were delivered this year. These planes already have been financed out of previous year's appropriations. Navy is receiving new aircraft now at a rate estimated at 3,000 annually.

Navy officials testifying before the Senate Appropriations Committee said they were willing to accept a "breathing spell" in their aircraft procurement to permit phasing out of rapidly obsolescing models now in production and the rapid introduction of new combat types expected to eliminate the technical inferiority that has afflicted Naval aircraft for the past three years. The new types to be brought into production during the next year include:

- **McDonnell F3H Demon** transonic jet fighter.
- **Douglas A3D** twin-jet bomber.
- **Douglas A4D** delta-wing jet interceptor.
- **New Grumman fighter** still heavily veiled by security restrictions.
- **Chance Vought A2U** attack version of the Cutlass.

To finance this program, Navy is expected to ask for an increase in aircraft procurement funds for fiscal 1955.

Navy Secretary Robert Anderson testified that only 16% of the current aircraft inventory is jet propelled and that by the end of 1955, only 37% would be jets. Navy is expected to maintain an inventory of 9,941 aircraft during this period.

Good Pilots Are Key To Air Power: Lacey

Despite avionic achievements improving modern aircraft, the man behind the controls still is the key to air power, according to Maj. Gen. J. K. Lacey, commanding general, Crew Training Air Force, Randolph AFB, Tex.

In fact, says Gen. Lacey, "it is axiomatic that bigger, faster, longer-ranged aircraft with electronic gun-bomb-rocket systems are going to require an upgrading of skills in pilots and other aircrew members."

The general told AVIATION WEEK that new technical developments are "frequently a challenge to the crew member's ability rather than a crutch on which he can lean."

While today's pilots are not supermen, he says very few of them are receiving recognition "fully commensurate with the merit of their service."

He lists three basic steps in obtaining pilots for today's combat:

- **Procurement.** Getting the man with the required mental capacity, moral fiber and physical stamina.
- **Training.** Teaching him to use his airplane as a weapon to deliver firepower against an enemy.
- **Motivation.** Developing his combative spirit and getting him to do his level best.

There is less tolerance today for indecision and error in judgment on the part of pilots, the general says. "Remember that today's modern bomber costs 10 times as much as a corresponding type in World War II, and has five times the horsepower, four times the range and four times the bomb load," he says.

"Electronic equipment on one of the new Air Force bombers—which includes 2,143 tubes—costs as much as two complete B-29s. Fighters also have come a long way in the past eight years. The latest Air Force fighter required 27 times as many engineering manhours as its World War II counterpart. The price of electronic equipment on one of our new fighters would buy a World War II model complete."

New Jets Highlight Detroit Air Show

A large-scale aviation trade show with more than 2 million sq. ft. of exhibits and a four-hour flight show, ranging from early pre-World War I types down to new military jets, will commemorate 50 years of aviation progress at the sixth annual Detroit International Aviation Exposition to be held July 9-12.

First public flight review of a complete squadron of Boeing B-47 Stratojet bombers in formation will be an Air Force highlight at the Detroit-Wayne Major Airport show.

Eastern Air Lines will present its span of life show, with a rebuilt early pusher plane, a World War I Spad similar to that flown by Capt. Eddie Rickenbacker—an original Pitcairn Mailwing biplane—and later planes down to the airline's present transport equipment—Lockheed Super Constellation and Martin 4-0-4 Silver Falcon.

Early signers for participation in the trade show, displayed in two quarter-mile-long pavilions lining the entry to the spectator stands, include: Allison, Aeroproducts and Chevrolet Divisions of General Motors; Continental Motors; Eaton Manufacturing Co.; Packard Motor Car Co.; Bendix Aviation; Republic Aviation; Hughes Aircraft; Cessna Aircraft; Beech Aircraft; Holley Carburetor; Aero Design; de Havilland; Kaiser-Frazer Corp., and others.

The Detroit show is one of two major aviation expositions this year having national status for trade show participation by the aircraft and airline industries.

The other scheduled is the National Aircraft Show, Dayton Municipal Airport, Vandalia, O., Labor Day weekend, Sept. 5-7.

Principal officials of the Detroit show include: general chairman, C. J. Reese, president of Continental Motors Corp.; senior military liaison officer, Rear Adm. Dan Gallery; advisory committee chairman, H. R. (Bill) Boyer, General Motors; general manager, James V. Votta, Aero Club of Michigan executive vice president; and Lawrence F. Zygmunt, president of General Aircraft Supply Corp., and E. Tilson Peabody, General Motors executive air fleet manager, chief and deputy chief of operations.

New Swift Tested

(McGraw-Hill World News)

London—A more powerful, more heavily armed version of the RAF's Supermarine Swift sweptwing fighter has flown for the first time. Designated the Swift F.4, it features afterburning on its Rolls-Royce Avon engine, bringing the thrust up to approximately 9,000 lb., as compared with the 7,200-lb.-thrust Avon used in powering the earlier Swift F.1.

The new Swift is designed to take four 30-mm. cannon instead of the F.1's two cannon and is believed to have improved control mechanisms providing better maneuverability than the earlier model.

Under consideration in the off-shore program for some time, these modifications were applied hurriedly after Maj. Gen. Al Boyd, USAF chief test pilot, last winter recommended the Hawker Hunter over the Swift F.1 (AVIATION WEEK Jan. 19, p. 15).

Swift-Hunter competition still is very much alive. The first Hunter with afterburner is scheduled to fly in the next few weeks, and both new models are certain to show their paces to international aviation experts at the Society of British Aircraft Constructors display at Farnborough, England scheduled for this fall.

C-119 Hearing

- **McCone defends Kaiser contract as emergency.**
- **But Bridges calls project a "jump-the-gun" award.**

The Senate's Armed Services Subcommittee investigation of military aircraft programs opened its first series of hearings with former Undersecretary for Air John McCone defending the Air Force award of a contract to Kaiser-Frazer Corp. for production of C-119 "Flying Boxcars" on the eve of the national emergency declared in December 1950.

Unit costs on C-119 production at Kaiser-Frazer's Michigan plant have been far higher than at the Hagerstown, Md., factory of Fairchild Airplane and Engine Corp., which developed the cargo transport. Original K-F unit cost was $1.2 million, compared with $260,000 at Hagerstown.

House Armed Services Committee investigated the K-F contract a year ago but took no action. It was the feeling of committee members at that time that the Kaiser-Frazer award was the result of incurring additional costs to open second and third sources of production to broaden the industrial base.

▶ **Investigation Scope**—In an opening statement, Chairman Styles Bridges said the Senate subcommittee's aim in its coming investigations will be to see "whether the country is getting a dollar's worth of defense for each dollar spent in the purchase of airplanes."

"If we are to ensure an adequate and effective Air Force we must also ensure that wasteful and inefficient practices are eliminated," he declared. "We intend to get the facts for the country regarding awards to producers and the performance on contracts. We intend to evaluate price relative to performance, to examine whether there is waste, extravagance or inefficiency in the companies which are suppliers to the air services."

Declaring that "there has been great waste in some instances in the purchase of airplanes," Sen. James Duff said: "Everybody admits the need for a larger Air Force than we now have. The problem is how best to get it. I am positive that the aim of the Administration is to get that larger Air Force by methods whereby a lot of our tax money does not go down the drain."

▶ **K-F Contract Facts**—Skeptical of the rapidity with which USAF awarded Kaiser-Frazer the C-119 contract, Bridges' questioning of McCone developed these facts:

- **At 10 a.m. on Dec. 5, 1950** Reconstruction Finance Corp. announced a $25-million loan to K-F. A few hours later, Henry J. and Edgar Kaiser visited McCone, then Undersecretary in charge of production, at his Pentagon office to point out that capacity at Willow Run was available for defense work. Automobile production was being cut back at that time because of the material shortages. McCone said he was aware RFC had "suggested" that the corporation obtain a defense contract to back up the loan.
- **At 2 p.m. the same day,** Lt. Gen. K. B. Wolfe, then Deputy Chief of Staff for Materiel, telephoned the Fairchild plant and said Edgar Kaiser was going to make a visit to obtain engineering data. Bridges considered this "high handed." McCone said there might have been "greater formality" in notifying Fairchild but pleaded that defense officials were rushed at the time working out the emergency program.
- **At a meeting of top officers** at Wright-Patterson AFB on Dec. 15, 1950, Air Materiel Command decided

CUTLASS SHOWS NEW NOSE

This Chance Vought F7U-3 Cutlass twin-jet Navy fighter sports a shorter, more streamlined nose than shown on earlier versions. The long, pointed boom projecting from the fighter's nose is installed for mounting flight test gear.

to award a contract for production of 134 C-119s to K-F (as amended, the contract now calls for 159). McCone said he later approved the decision. He also reported that at the time Chief of Staff, Gen. Hoyt Vandenberg expressed concern to him about dedicating the Willow Run capacity to production of Flying Boxcars instead of B-47s. But, McCone explained, adequate capacity for the jet bomber was available at Tulsa, Wichita, and Marietta.

• **Four days later, Dec. 19,** K-F submitted a proposal, and a letter of intent was dispatched Dec. 20.

Bridges was critical of USAF for moving into Willow Run production without first investigating the suitability of its facilities and for deciding to award a contract for the work before cost estimates had been reviewed and examined.

• **Behind the Dec. 15 AMC decision,** McCone explained, was a determination that the Air Force required not only a stepup in C-119 output but also a second supplier. If the determination had been only to get more planes, he said, he would have recommended that another plant under Fairchild management be brought into production. At the time, McCone reported, Hagerstown output was approximately eight C-119s a month. Under the emergency program, the requirement was set at 1,800, with production reaching 135 a month by mid-1953.

• **Pointing out** that former Secretary of Defense George Marshall did not announce the "broaden the base" policy until Dec. 18, Bridges said he couldn't see why USAF had to "jump the gun" on a cargo plane project and didn't feel similar urgency in B-47, F-84 and other key fighting aircraft production. The subcommittee chairman reported that by June 1951, the K-F C-119 program was being "phased out."

NYC Airports Plan Bi-Directional ILS

Port of New York Authority has asked Civil Aeronautics Administration to budget funds for installation of two-directional instrument approach systems at Idlewild International, La Guardia and Newark airports. If approved, traffic capacity and instrument weather operations at the New York air terminals can be stepped up considerably.

▶ **New Approaches**—The three major metropolitan airports currently are equipped to handle instrument approaches only from the southwest, forcing aircraft to circle when an approach is made from this direction and the wind is bearing from the opposite.

In cooperation with CAA, the Authority would implement La Guardia's bi-directional approaches, including mounting lights on piles in the over-water approach from the northeast to Runway 4-22.

At Newark, a two-direction instrument runway would necessitate abandoning aircraft parking apron and taxiway areas to allow for placement of approach lighting.

▶ **Idlewild Master Plan**—PNYA has completed and submitted to CAA a new master plan for Idlewild International runways that calls for a dual parallel system to permit simultaneous landings and takeoffs during instrument weather. A new 8,400-ft. instrument runway would be parallel to and 3,000 ft. east of existing Runway 4-22.

Under the master plan, which supersedes the original 12-runway tangential pattern planned for Idlewild, existing Runways A and D would be used as secondary runways. Inactive Runways E and F and the area previously reserved for future construction of Runway U would be converted to other activities than landing and takeoff.

PNYA will abandon its previous plans to acquire approximately 29.5 acres north of the field and instead will take over approximately 90 acres northeast of the proposed new runway and another 80-acre area northeast of Runway 4-22 for installation of approach lighting.

▶ **Traffic Expansion**—The 12-runway tangential scheme was abandoned after study by the Port Authority, Air Transport Assn. and the airlines, which indicated that despite use of electronic aids in controlling traffic, increased speed of transports makes greater distances between aircraft a must. No airport in the New York area safely can handle six simultaneous landings and takeoffs as contemplated under the tangential plan, PNYA reports.

It is believed the new runway system will be capable of taking a considerable expansion of air traffic, reaching a peak hour total of 110 movements. Between 40 and 50 would be handled by Idlewild International.

New York-Balboa Case Starts Again

The New York-South America airline interchange fight among five major carriers starts all over again today, June 8, with prehearing conference before a Civil Aeronautics Board examiner scheduled.

Both the Eisenhower and Truman Administrations rejected the unanimous CAB decision which went against Pan American and Eastern in this so-called New York-Balboa through-service case.

▶ **Board on Spot**—Of five present CAB members, four have voted on several occasions against the Eastern-Pan American agreement to give one-plane service from New York to Central America and western South America.

The final decision in the case now remains uncertain since Republican members Oswald Ryan and Chan Gurney are reconsidering in light of President Eisenhower's rejection of their earlier opinion.

CAB denied the Pan American-Eastern contract on grounds it allied two large carriers against two smaller airlines, National and Braniff. The Board recommended a Pan American-Panagra-National tieup and a competitive Braniff-Eastern union.

Legally, the burden of proof is on CAB to show that the Eastern-Pan American agreement is contrary to the public interest.

The plea of both the airlines—Eastern and Pan American—that this cannot be shown apparently influenced the White House to throw the case back to the Board for retrial.

LARGEST NON-RIGID AIRSHIP FLIES

Goodyear ZP2N "Nan" anti-submarine warfare blimp, the largest ever built, is seen during its initial test flight at Akron, Ohio. The ZP2N's envelope contains 975,000 cu. ft. of helium. Its prototype, the ZPN (Aviation Week Apr. 20, p. 59) was delivered to the Navy a year ago and has a capacity of 875,000 cu. ft. An undisclosed number of ZP2Ns are being made by Goodyear Aircraft Corp., Akron.

Bell Evaluates Copter Safety

Report lists 22 fatal accidents in analysis of more than 500,000 flight hours by 1,000 helicopters.

By Alexander McSurely

Ft. Worth—Substantial proof of the helicopter's claims for safety in operation are provided in the first large-scale copter flight operation accident report compiled by Bell Aircraft Corp.

An analysis of Bell helicopters—now numbering more than 1,000—lists 22 fatal accidents in more than 500,000 flight hours, during the seven years since the company began its rotor-blade aircraft development.

▶ **Early Flights**—The record, compiled for the period ending Dec. 31, 1952, includes the earliest experimental flights of the company during a critical period when accident rates normally sky-rocket because of inexperience of pioneering designers and first test pilots.

Bartram E. Kelly, chief engineer of the Bell Helicopter Division, says the report tallies a complete list of accidents involving serious or fatal injuries to personnel and/or major damage to the Bell helicopter. It represents a total of 251 accidents. This indicates that only one accident in 10 serious ones has resulted in a fatality. Analyzed on a flight-hour basis, there has been one fatal accident for each 22,718 hr. of flight.

▶ **First Data**—As the first detailed data compiled since the U. S. helicopter's origin on a scale large enough to be of statistical value, the Bell summary provides a new means for evaluation of overall civil and military copter operation.

▶ **Crash Causes**—Classification of accidents under four major causes attributed:

- **167 to pilot error.**
- **49 to malfunction of the helicopter.**
- **19 to engine malfunction.**
- **16 to faulty maintenance.**

This indicates an interesting factor in the overall safety record of the copter has been the relatively high dependability of proven powerplants used. Power dependability from the start has given the early helicopter an advantage in safety not enjoyed by new air, surface or sea vehicles.

Another classification of accidents by operation showed 106 happened in student training, 54 in agricultural flying, 30 in geological survey, 22 in cross-country, 16 in rescues, seven in experimental flying, four each in ground accidents, powerline patrol and newspaper work, and three in scheduled carrier operation.

Some 120 accidents, nearly half the total, were attributed to various military users, including Army, Navy, Air Force, Coast Guard, and Argentine navy. The balance swung sharply to military accidents in the last two years, reflecting outbreak of war in Korea.

▶ **"Error" Breakdown**—Recognizing that recurrent "pilot error" accidents—uncorrected in redesigning for safety—can be laid later at the doorstep of manufacturers and designers, the Bell organization has made special study of various types of pilot accidents.

Forty-seven accidents, more than a quarter of the total, happened when the pilot did not maintain sufficient control near the ground.

Rotor mishaps of various types accounted for 40 accidents, including 10 in which tail rotor struck the ground, four in which a person on the ground walked into the whirling tail rotor, 12 in which the tail rotor struck an obstruction and 14 in which the main rotor hit an obstruction.

Other accidents also classed as pilot error included 19 bad landings in autorotation, six bad landings with flotation gear on water, three downwind takeoffs in which the copter settled to the ground, 14 ground accidents with damage to the helicopter, four in which the pilot "ran out of gas" and 34 miscellaneous accidents attributed to factors such as unsuitable landing area, carrying overload, etc.

While most of the crackups reported involved the two-place Model 47 copter, Bell's main sales item in military and civil production, four of the accidents involve the larger YH-12, and others the early experimental Model 30 and Model 42.

Sabre 45 Flies

North American YF-100 made its first flight last week at Edwards AFB, Calif., with George Welch, NAA chief test pilot, at the controls.

First details of the YF-100 (also known as the Sabre 45) were inadvertently revealed by the Air Force this month (AVIATION WEEK June 1, p. 7) when two returning jet aces from Korea were posed for Pentagon photographers with a model of an early version of the F-100.

The model revealed salient features of the F-100 design, including a 45-deg. wing sweepback; greater ratio between root-chord and tip-chord of the wing; new type streamlined external fuel tanks; highspeed canopy design, and a lowering of the horizontal tail fin.

USAF has ordered the F-100 into quantity production. It is powered by a Pratt & Whitney J57 with afterburner producing about 15,000 lb. total thrust. The F-100 is expected to gross about 24,000 lb., compared with about 16,000 lb. for the F-86 series.

NYA Plans Helicopter Passenger Service

Regularly scheduled passenger helicopter operations will be inaugurated in the metropolitan New York area July 1 by New York Airways, using five Sikorsky S-55s in a shuttle service from La Guardia, Idlewild International and Newark Airports 11 times daily. Fares approximate taxi tariffs between the fields. Flight time will be approximately seven-eight minutes between La Guardia and Newark and 18 minutes between Idlewild and Newark.

The copters are being modified by Lockheed Aircraft Service at Idlewild International, to take four folding seats and necessary webbing for holding mail, parcel post and freight. Each S-55 has a 1,200-lb. payload. Passenger flights will begin in the early morning and continue through early evening. Mail deliveries, which reach their peak during the early morning and later afternoon hours, will continue to get first priority.

New York Airways plans to extend its passenger-carrying copter activities to other sections of its CAB-certificated routes when larger, twin-engine equipment becomes available.

Fletcher Readies New 'Baby Bomber'

Fletcher Aviation Corp., Pasadena, Calif., plans to fly its first FD-25-B "Baby Bomber" tactical support monoplane this month and has scheduled a series of demonstrations for this summer.

The company also has received word that Tokyo Aircraft Co., its Japanese licensee, expects to have the first model of the earlier FD-25 off its line this month and has scheduled production of 50 planes for this year in a plant purchased from RCA Victor in Japan.

The FD-25-B, powered by a 250-hp. engine, is designed for a top speed of 187 mph. and landing speed of 41

mph. Service ceiling is planned to be 15,000 ft. and range at 560 mi. Fully loaded, the FD-25-B will take off in 500 ft. and land in 330 ft.

It is designed to carry two .30-cal. machine guns, each with 1,000 rounds of ammunition, and 650 lb. of additional military stores for a gross weight of 2,500 lb. Four five-inch or 40 2.75-in. rockets may be fitted under the wings. Napalm, two 250-lb. general-purpose bombs or ferry tanks also may be carried.

Pilots Are Blamed In DC-3-Cessna Crash

Civil Aeronautics Board last week entered a finding that probable cause of a landing collision between two airplanes at Richmond, Ind., airport Dec. 15 was failure of the pilots to observe and avoid each other.

Sherman H. Graves, manager of Cessna Aircraft Co.'s Helicopter Division, Wichita, was killed and his Cessna 170 demolished in a collision with a Lake Central Airlines' DC-3. None of the nine occupants of the DC-3 was injured. The transport plane received minor damage.

Cited as contributing factors were Graves' approach "cutting in" to land on a runway contrary to the prevailing wind direction, intersecting at a 50-deg. angle with the runway on which the DC-3 was landing simultaneously, and inadequate ground monitoring of the DC-3 landing after an instrument approach. Ice on the Cessna windshield and on the rear portion of the side cockpit windows of the DC-3 obscured vision on both planes. Ice was found on the leading edges of both wings and also on the horizontal stabilizer of the Cessna.

American Cuts Fare On Shorthaul Coach

American Airlines has filed at Civil Aeronautics Board a slightly reduced fare on the New York-Washington segment of its transcontinental coach flights.

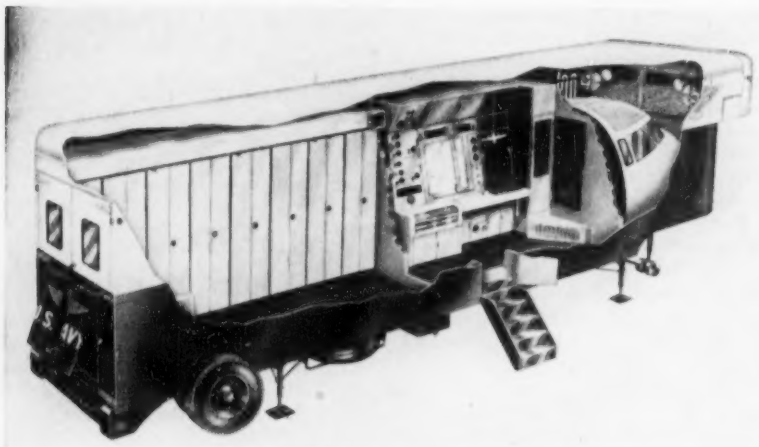
CAB threatened to suspend American and Eastern Air Lines' practice of charging first-class fares on short segments of long coach flights.

Longhaul coach fares generally are four cents a mile; medium is four and a half cents. American's new tariff would be about six cents, the same as longhaul first-class rates. Fixed cost of ticketing and servicing customers accounts for lack of flexibility in shorthaul rates, the airline says.

Washington observers predict Eastern will file a tariff identical with American's, because competitive rate cutting is unusual in the certificated airline industry.

CAB would prefer a somewhat lower rate, but is expected to approve the new proposal.

Some observers say that if the Board were to insist on much lower shorthaul coach rates, it might discourage airline cooperation in CAB's program for expansion of tourist service.



NAVY GETS FIRST P2V-5 SIMULATOR

Cutaway details the interior of new simulator of the Lockheed P2V-5 Neptune patrol plane delivered to Navy by Engineering & Research Corp., Riverdale, Md. The Erco-designed-and-built Flightronic P2V-5 is completely housed in a trailer providing easy mobility. It is expected to cut training costs and time considerably. Electronic computers provide the brains and muscles for duplicating the actual plane's characteristics right down to engine and propeller noses and bouncing caused by rough air. Another valuable feature of the Flightronic unit is that it can be coupled to a P2V-5 tactics trainer being built by Erco, permitting indoctrination of an entire crew.

Committee Boosts Airport Aid Funds

Overriding Presidential opposition, the Senate Appropriations Committee voted $12.5 million for new airport construction in Civil Aeronautics Administration's budget for the 1954 fiscal year.

The committee added that amount to the $22.7 million recommended by the President and approved by the House to liquidate airport contracts already entered into. The $12.5 million, still subject to House approval, won't go far in satisfying demands of local governments which have raised a total of $75 million for airport construction and are awaiting matching federal funds before going ahead with projects.

The CAA budget approved by the Senate committee totals $148 million, approaching CAA's fiscal 1953 budget of $149 million. The Truman budget proposed $200 million; the new Administration recommended $140 million; the House allowed $139 million.

The Senate committee allowed $3.8 million for Civil Aeronautics Board. This is final since it is also the amount approved by the House. The Administration proposed $3,800,000, same as fiscal 1953.

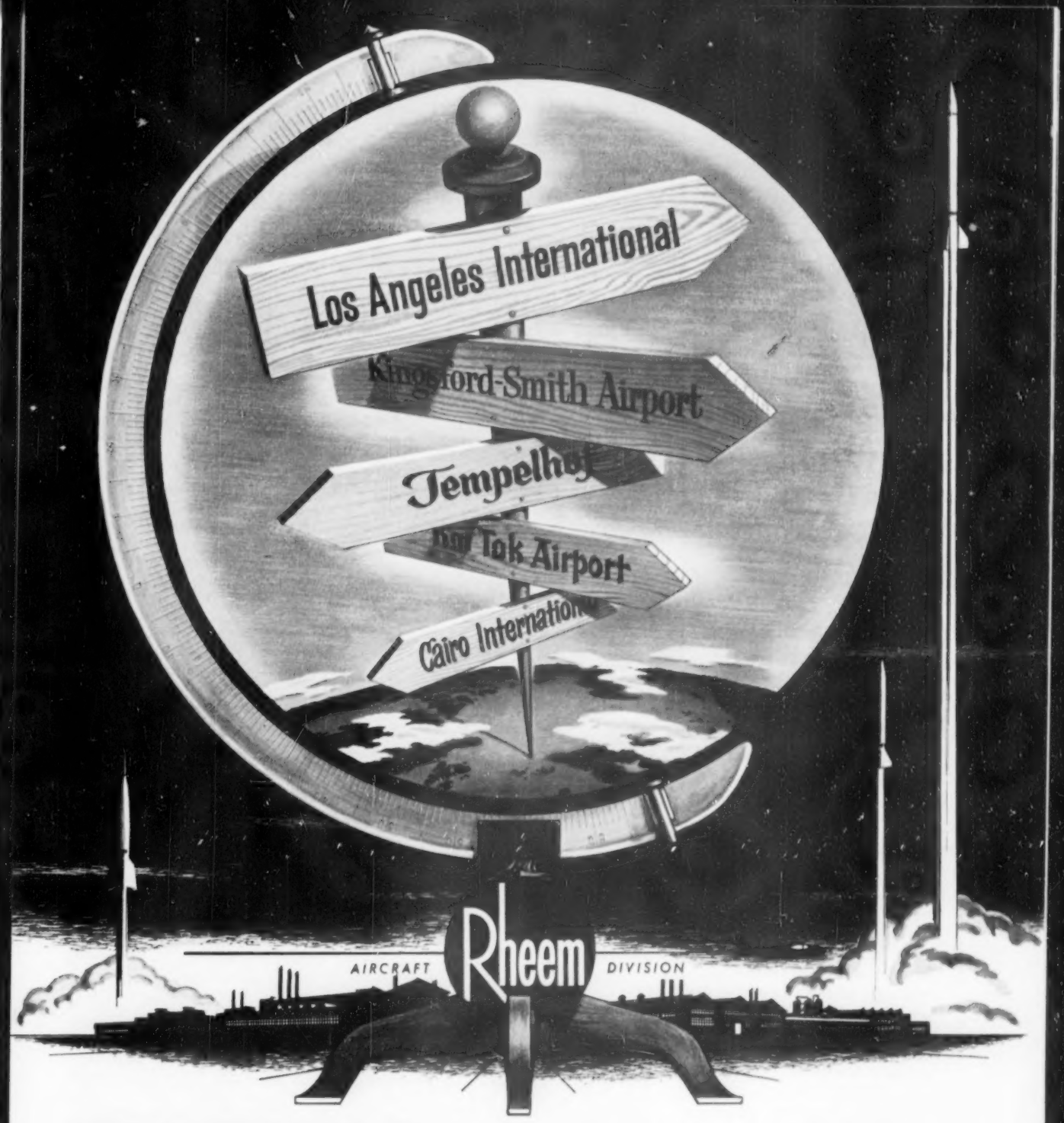
Here is a breakdown of amounts which have been allowed CAA by the Senate committee.

- **Salaries and expenses,** $104.5 million. This is $5.8 million below the Truman recommendation and $1 million under the House allocation. It is stipulated that no part of the reduction should be applied to operation of the federal airways or aviation safety activities.
- **Establishment** of air navigation facilities, $5 million. This is $2 million below the House figure and $13 million below the Truman recommendation. It allows for no new projects.
- **Technical development,** $500,000, compared with the Truman estimate of $1,163,000. The committee felt this work duplicates activities of the military services and National Advisory Committee for Aeronautics.
- **Air navigation development,** $1,085,000, compared with the $4 million which was recommended in the Truman budget.

Italy Builds Ratos for AF

(McGraw-Hill World News)

Rome—More than 500 rocket assist takeoff units (Rato) have been delivered by the Italjet Co. to the U.S. Air Force, which will have them sent to Turkey for use by that country's air force. These units comprised an initial batch of an order for several thousand Rato units to be manufactured by the Italian firm in the next few months.



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CAB Plans Renewal Of 4-Cent Coach Fare

Renewal of aircoach fares at the present level of 4 to 4½ cents a passenger-mile tentatively is planned by Civil Aeronautics Board. The CAB staff has started preparing data for a coach policy decision and public statement.

In its coach policy statement of November 1951, the Board said it would serve notice of its intentions of fares four months before the expiration of current tariffs. All present domestic aircoach fares expire Dec. 31, setting an Aug. 31 deadline for CAB to spell out its new coach fare.

▶ **Expansion Incentive**—Tentative plan is to exhort the airlines to greater efforts toward expansion of aircoach service, particularly to intermediate cities and shorthaul routes not receiving direct tourist flights.

The Board plans to offer continuation of present coach fares as an incentive to that expansion. High profit margins on some high-density routes could be interpreted as an invitation to a fare cut, but CAB's present policy is to urge airlines to plow back profits into more aircoach expansion and experimentation. That policy was stated generally in the Board's majority opinion dismissing its general passenger fares investigation (AVIATION WEEK May 25, p. 96).

▶ **Fare Breakdown**—Longhaul coach fares are about 4 cents a passenger-mile. Medium-haul coach fares are about 4½ cents a mile.

There is little shorthaul coach service except on the competitive Los Angeles-San Francisco run, and the fare there is less than 4 cents a mile.

First-class fares are 6 cents a mile for long and intermediate distances and about 6½ cents for short haul.

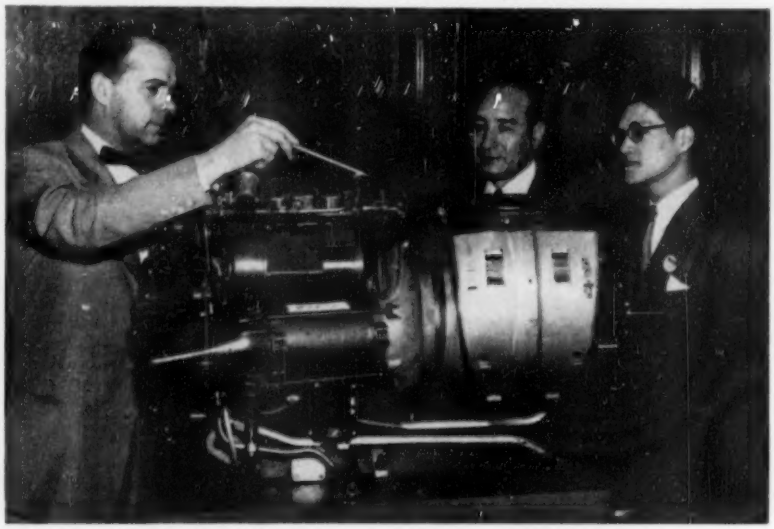
CAA Eliminates 13 Safety Field Offices

Civil Aeronautics Administration has eliminated 13 safety inspection field offices and handed their territories to centrally located "central bureaus." CAA administrator Fred B. Lee says this "will give better service at less expense."

The field headquarters will dispatch safety officials to examine pilots, planes, schools and repair bases at outlying airfields, CAA says. Staffs of the remaining central bureaus will be augmented.

Major changes: New Orleans, Birmingham and Jacksonville divide Mobile's former territory. Nashville and Jackson take over Memphis. Tampa takes Orlando. Midland absorbs El Paso. Albany covers Syracuse. Rochester takes over Buffalo. Alexandria, Va., supervises Baltimore. Richmond takes Roanoke. Charleston, W. Va., absorbs Clarksburg and part of eastern Kentucky. Cleveland and Columbus split Toledo. Cincinnati takes part of northern Kentucky. Chicago covers Elmhurst, Ill. Minneapolis and Warsaw, Wis., share Rochester, Minn., territory. St. Louis takes East St. Louis.

One new office will be established at Charleston, W. Va.



JAPANESE INSPECT BOEING TURBOPROP

Japanese visitors to Boeing Airplane Co., Seattle, Wash., inspect the workings of the company's little Model 502 turboprop engine. Amos L. Wood (left) Boeing service manager, explains engine's details to industrialist Shiro Kayaba (center) and A. Nakayama, Japanese vice counsul in Seattle. Kayaba, board chairman of Kayaba Industry Co., is studying applications of the 200-lb. turbine for use in commercial helicopters. This type of engine is currently flying in a Kaman K-225 copter.

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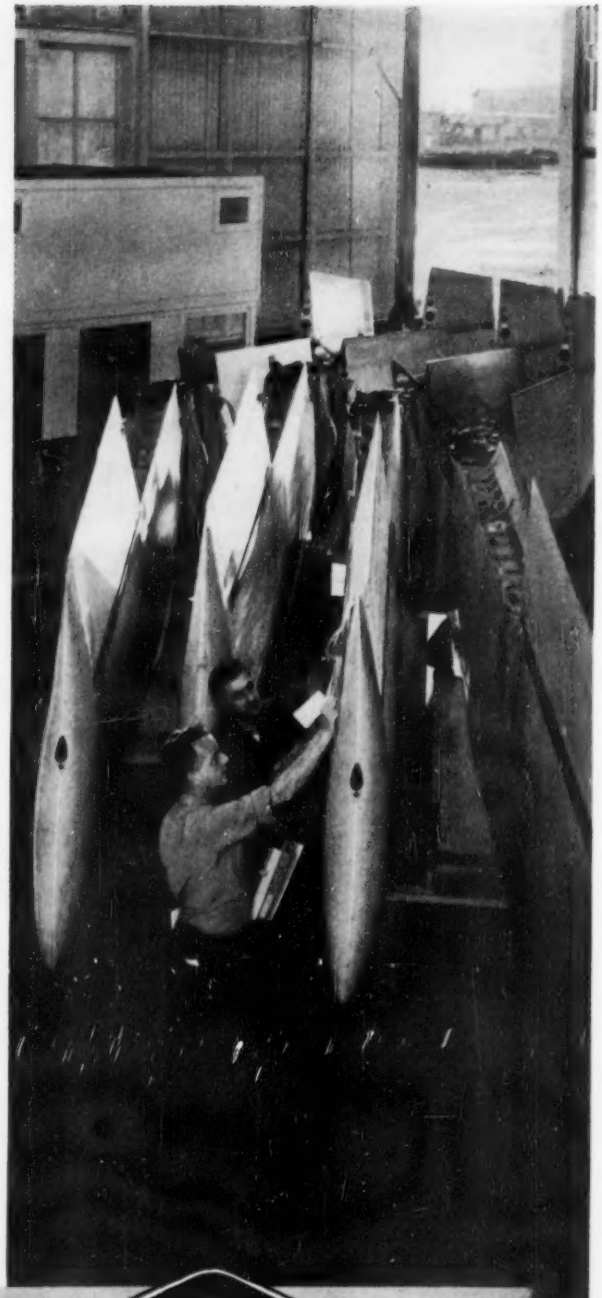

Complete wing assemblies—built by Goodyear Aircraft—for North American Aviation's T-28 airplane. The T-28, newest and most modern of the Air Force training planes, actually carries more equipment than the famed Mustang fighter of the Second World War.

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WORLD NEWS

Aviateca Buys DC-4s For New U. S. Routes

Guatemala City—The government-owned Aviateca airline is adding new four-engine equipment to its fleet for use on proposed international routes between Guatemala City and New Orleans and Miami. The carrier plans twice-weekly flights to these points.

Aviateca already has set aside $600,000 for purchase of a Douglas DC-4 and plans to buy another one later this year. The airline operates seven DC-3s and one C-46 on scheduled routes within Guatemala and nonsked cargo flights to New Orleans. Its planes fly daily into jungle landing strips, some less than 1,200-ft. long.

Aviateca's aircraft utilization averages 3¼ hr. daily, except during the peak season when the average goes up to five hours.

Since reorganization a year ago, Aviateca's new president, Capt. Ricardo Rodriquez Paui, has cut expenses approximately 30%, some of which was accomplished by paring personnel by 20%. The carrier consistently shows a small profit, despite a 25% loss of revenue formerly gained from air-freighting chicle, used in chewing gum, from Northern Guatemala to the Caribbean coast. Use of synthetic chicle killed this aspect of the carrier's business.

In the past year Aviateca has grossed approximately $1.2 million; some 55% from passenger business, 20% from international charter and 25% from domestic and international cargo flights.

Despite difficult flying conditions, the carrier has had an unblemished safety record for 14 years.

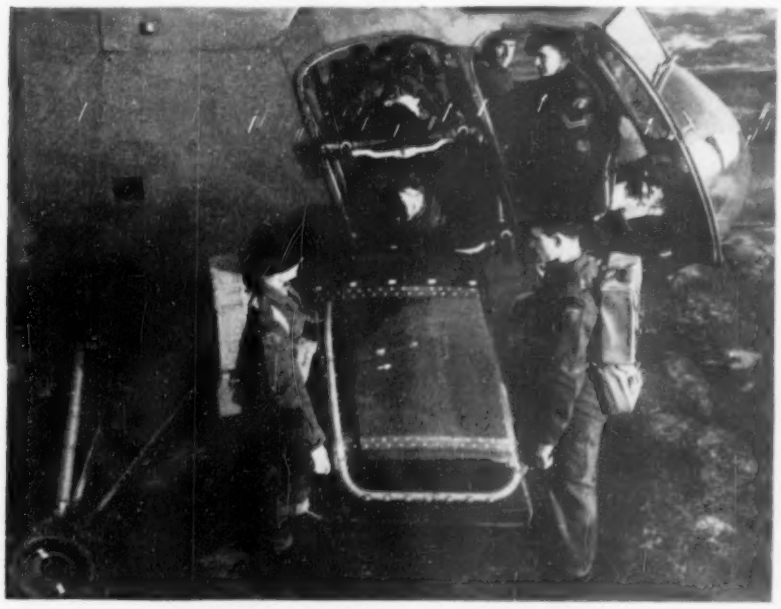
ARDC Awards Italy $28,000 Contract

Rome—A two-year research program in aircraft structures is to be carried out at the Air Engineering School, Rome, under a contract recently placed by the U. S. Air Force's Air Research & Development Command.

The $28,000 contract, believed to be the first of its kind placed in Europe by ARDC, will involve a special "balance method" developed by Prof. Luigi Broglio of the Air Engineering School.

PAA-ANA Sign Pact

Melbourne—Mutual exchange of passengers and air cargo by Pan American World Airways and Australian National Airways is covered in an agreement recently signed by the carriers. ANA will act as PAA's general agent in Australia for air cargo sales and passenger book-



BRISTOL COPTER AS AMBULANCE

Demonstration of casualty evacuation features of Bristol 171 Sycamore Mk. 10 helicopter shows two British soldiers about to hook up a large transparent Perspex blister to enclose the stretchers. Use of a plastic blister on each side of the fuselage permits carrying the stretchers internally on the Sycamore.

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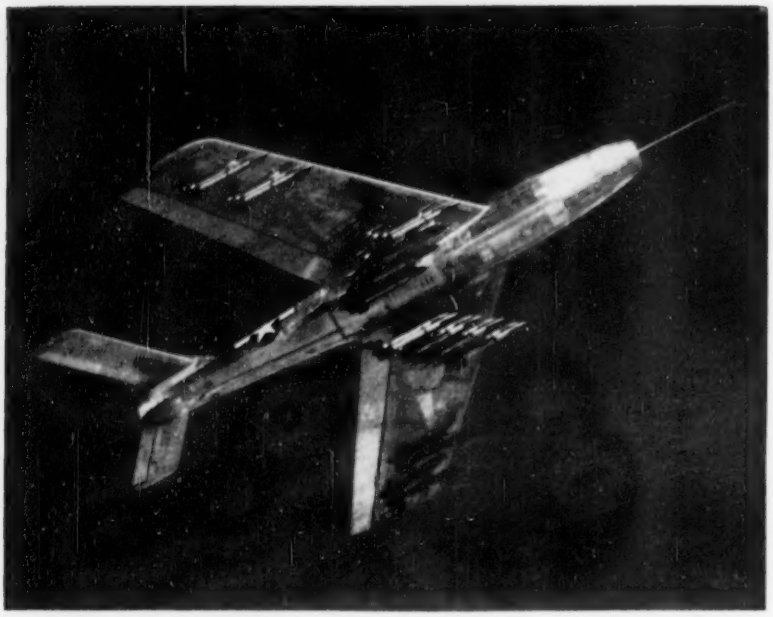
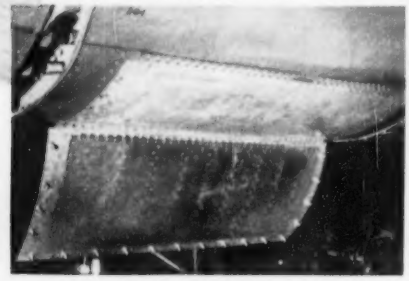


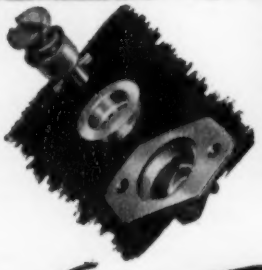
NEW REPUBLIC THUNDERSTREAK PACKS SUPER-WALLOP

This first in-flight photo of Republic's F-84F swept-wing fighter shows the plane's punch-packing prowess as a ground support fighter-bomber. Here it carries 24 five-inch High Velocity Aircraft Rockets. As a fighter the F-84F is capable of very high speeds and exceptionally long range operations. As a ground support plane, it is designed to carry even more armament than its sister model, the F-84G.

Photo (left) shows the wide variety of armament carried externally by the F-84F . . . 24 five-inch HVAR Rockets, or four 1000 lb. bombs, or two 1000 lb. bombs and two 230 gal. fuel tanks. Other armament such as Napalm tanks, smoke tanks, or anti-personnel bombs can also be carried.

Photo (below) shows Camloc Fastener installation in the engine compartment access door on bottom of fuselage. Camloc Fasteners are also installed on varying contours and in highly stressed areas.





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SAS Issues Studies Of Foreign Trade

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SAS has compiled vital statistics about Norway, Denmark, Sweden and Germany entitled "World Trade Bureau Reports." The report on Norway, for example, covers: country and people (area and population), currency, investments, taxes, industries (agriculture, forestry, fishing, mining, minerals and allied industries, furs, shipping and industrial production), foreign trade (imports and exports), what the American businessman should know about trading with Norway, tariff policy and structure, import, export and exchange controls and terms of sale.

Philippine AF Chief Urges Air Buildup

Manila—Establishment of an aviation industry in the Philippines is urged by Col. Benito Ebuen, chief of the Philippine Air Force. He says PAF imports most of its equipment and other supplies from abroad and describes development of the country's air power as a rich field for utilization of idle capital.

Such development would strengthen national economy as well as Philippine military defense, Col. Ebuen says. He also cites efforts of the Nationalist China government on Formosa and by Japan to build aviation industries with limited resources. "The Philippines," he says, has "vast natural resources, native ingenuity and bright vision of the future."

The Philippine House of Representatives has approved a bill providing for establishment of an aeronautical research laboratory in the Institute of Science and Technology.

Australian Heliport

Sydney—The Australian government plans to incorporate a heliport at Kingsford-Smith Airport now under development. At present, there are only five helicopters in the country.

Meanwhile, large tanks for jet fuel are being installed for start of Comet turbine transport flight to Sydney. First stage of other construction consists of raising the level of the reclaimed area, laying out two new runways, installation of the drainage system, parking apron and enlarging storage and airport facilities.

AVIATION TURBO OILS

15 AND 35

The only lubricating oils pacing jet engine development

Esso Aviation Turbo Oils 15 and 35 are the only synthetic gas turbine lubricating oils in use today in substantial quantities which will stand up to the operating conditions of jet engines of enormous thrust now being developed. These oils are the direct outcome of technical research and foresight on the part of Esso aviation lubrication specialists working in close cooperation with British and U. S. aircraft engine designers and builders.

Why Synthetic Lubricants?

To meet the needs of today's gas turbine engines an oil must possess quite remarkable properties. Not merely must its viscosity-temperature characteristics be exceptional, but its pour point, flash point, volatility, high-temperature stability and load-carrying properties must all have advantages not possessed in combination by those lubricants formerly used.

The oil must permit rapid engine starting and be pumpable at very low temperatures. At the same time it must effectively lubricate the critical turbine bearings on both turbo-prop and turbo-jet engines at very high temperatures and have the ability to maintain the perfect condition of the propeller reduction gears on turbo-prop installations.

These requirements are not readily fulfilled, and cannot be met completely by a mineral oil even of the very highest quality.

But Esso Aviation Turbo Oils 15 and 35 satisfy them all.

Fully Proved Lubricants

Recognizing these facts at an early stage in gas turbine development, Esso research teams in Britain and the United States concentrated their efforts in producing synthetic oils equal to these new needs. Their results are Esso Aviation Turbo Oils 15 and 35, aircraft lubricants of proved efficiency.

E. A. T. O. 35 is now generally used in all latest types of gas turbine engines tested and flown in Britain. It is a fact that some of the latest British engines would be unable to run at full power without using E. A. T. O. 35.

E. A. T. O. 15 meeting Pratt & Whitney Aircraft specification P&WA-521A was used during the testing and development of the Pratt & Whitney Aircraft J-57 jet turbine engine and is an approved lubricating oil for this latest high-power axial-flow engine. E. A. T. O. 15 also is the only oil currently recommended for the Curtiss-Wright J-65 Sapphire jet engine for all power ratings.

For these reasons E. A. T. O. 15 and 35 are invariably used for the high-thrust jet engines now being developed in the U. S. and Great Britain – engines which have never known a mineral lubricating oil.

An Economic Investment

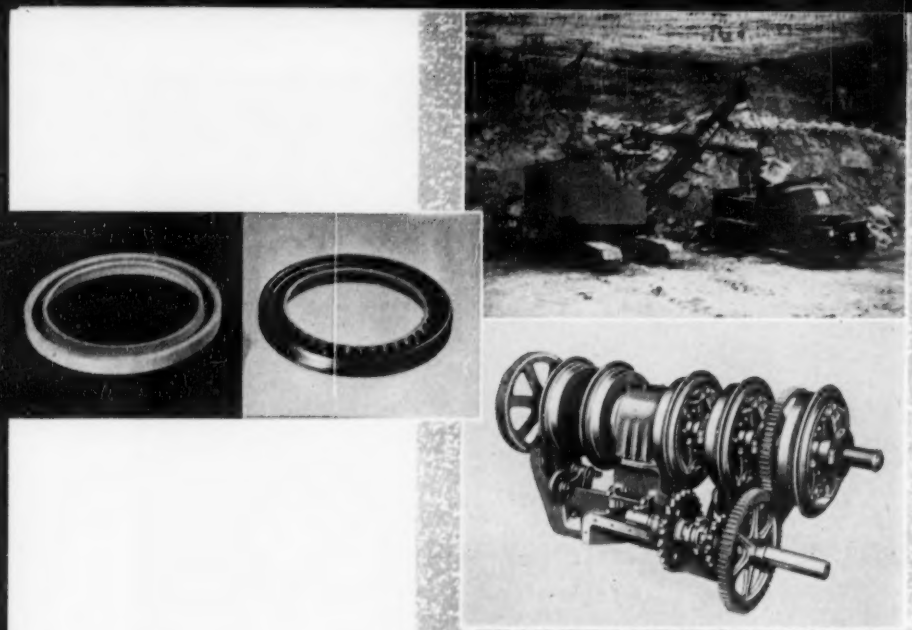
Gas turbine engines consume only a fractional amount of these synthetic oils per hour (less than a pint) but E. A. T. O. 15 and 35 will enable engines to maintain high power over long periods without loss of their unique properties. The cost of these lubricants – only 1/25th of the fuel bill – bears favorable comparison with the cost of oil consumed in a piston engine.

Convincing Demonstration

At the 1952 S. B. A. C. Display at Farnborough, England, the Rolls-Royce Avon engines installed in the Hawker Hunter, the de Havilland 110, the Vickers Valiant, the Supermarine Swift and the English Electric Canberra (with afterburners); the Armstrong Siddeley Sapphire engines installed in the Gloster Javelin and the English Electric Canberra, were *all* lubricated with Esso Aviation Turbo Oil 35.

Leadership in research and product development are good reasons why of all the world's international airlines, 7 out of 10 use

AVIATION PRODUCTS



SILASTIC*
Keeps Clutch Shaft Bevel Gears of Lorain TL-25's Bathed in Oil

Silastic lip seals look as good as new after more than 5 years of rugged service on the oil-filled clutch shaft bevel gear housing on the Thew-Lorain model TL power cranes and shovels. Conventional rubber seals failed frequently at operating temperatures in the range of 250°F. Silastic's long service life substantially reduces maintenance costs and production losses.

Performance proves...

SILASTIC works

where other materials fail!

The turntable is the "guts" of a power crane or shovel, the part that makes the "wheels-go-round", where profit-making performance begins, so it's not surprising that Thew-Lorain put Silastic to work in the TL-25's, their newest idea in turntable design.

Silastic has been performance-proved in thousands of mechanical and electrical applications. It retains its rubbery properties at temperatures ranging from −70 to above 500°F; shows excellent resistance to shock, vibration, oxidation, weathering, and to a wide variety of hot oils and chemicals.

And Silastic stocks for electrical applications are unique even among silicone rubbers for low water absorption and retention of dielectric properties and high physical strength after long aging at Class H temperatures. Proof of the inherent stability of Silastic is given in the graph showing the effect of aging at 275°C (527°F) on the dielectric strength of Silastic.

When you need rubbery properties at temperatures above or below the limits of organic rubbers, or good dielectric properties in a resilient and flexible material, ***specify SILASTIC.***

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U.S. Carriers Face Restrictions in India

India's attempts to restrict American air carrier operations within its borders have prompted discussions in New Delhi on the current bilateral U. S.-India air agreement.

Edward A. Bolster, chief of the State Department's aviation policy staff, and Walter Peck, chief of Civil Aeronautics Board's Foreign Air Division, flew to India to take part in the talks.

The Indian government seeks to protect its own airlines, currently undergoing nationalization (AVIATION WEEK Apr. 27, p. 93) by prohibiting U.S. carriers from operations within the country and on certain routes connecting India with its Asiatic neighbors. At present, Pan American World Airways and Trans World Airlines fly into India, and Northwest Airlines is known to be interested in an Indian route.

No Indian airline connects with the U.S., although Air India International, the proposed nationalized Indian airline, looks forward to future service to America.

In Bombay, meanwhile, members of India's socialistically inclined parliament indicate they will pass the Indian Airways Corporation Bill nationalizing AII and the domestic carrier, Indian Airlines, McGraw-Hill World News reports.

Tasman Seeks New Planes

Melbourne—Tasman Empire Airways, now operating Short Solent four-engine flying boats is contemplating conversion to land-based aircraft. Aircraft manufacturers are now trying to capture this important market. Industry observers say that the carrier currently favors the four-engine Bristol Britannia turboprop airliner.

Philippines-Thai Air Pact

Manila—A civil aviation agreement between the governments of the Philippines and Thailand has been signed in Bangkok, granting airlines of the two countries rights of transit and non-traffic stops plus the privilege of picking up and discharging international passenger, mail and cargo traffic in each other's territory.

New Swissair Route

Geneva—Swiss Air Lines is planning a new, direct service from Switzerland to South America. The showing Swissair made on flights to New York has encouraged it to look at the South American market. Final decision will have to be made by the Swiss government, which subsidizes the airline.

most compact elbow fitting

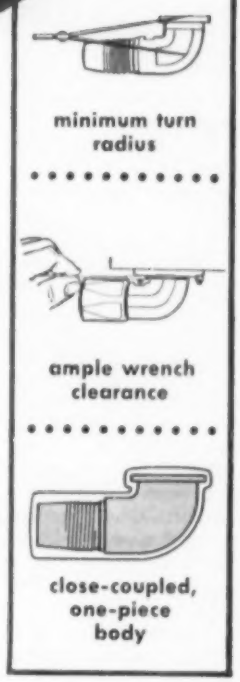
Resistoflex Hose Assemblies with sturdy forged aluminum elbows fit close quarters, eliminate adapters

Here are hose assemblies that can help you when space is at a premium. They have fittings with smallest dimensions for their I.D. and permit you to design more compact "plumbing" systems. Resistoflex Assemblies improve space factor even *more* when they replace combinations of swivel nut hose assemblies and angle adapters.

Machined with true turns from solid forgings, Resistoflex fittings assure full flow, minimum turbulence, and extra resistance to fatigue.

And remember—Resistoflex Hose Assemblies with flanged aluminum fittings have USAF and BuAER approval. Take advantage of our 4-year quantity manufacture of these aluminum elbows and their trouble-free service in jet engines and aircraft. Write for catalog.

Hose connecting end manufactured under license of Aeroquip Corporation



THE LATEST IN BACK-UP RINGS, TOO—MADE FROM "TEFLON"! Fluoroflex®-T spiral rings have optimum dimensional stability, inertness and heat resistance. They're easier to install, reduce friction and improve life of the assembly. Get specification data — write for Bulletin FR-1.

RESISTOFLEX
CORPORATION
Belleville 9, New Jersey

Specially Engineered Flexible Resistant Products for Industry

Engine Wear Testing Goes Radioactive

- **Study of irradiated oil tells rubbing tale.**
- **Wright's first trial of technique is successful.**

Radioactive materials are beginning to play a part in ferreting out quick and precise answers to important problems of engine wear.

This new research tool now is being applied at Curtiss-Wright Corp.'s Wright Aero Division plant at Wood-Ridge, N. J., to determine life expectancy and wear-rate of materials under consideration for jet engine parts.

▶ **Successful Trial**—Only one application has been evaluated thus far, but the success of the experiment points to a wide field for close checking of other vital jet components.

Tests for rubbing faces of seals have consumed significant amounts of time for engine manufacturers, requiring teardown for inspection and measurement. Wright expects the radioactive technique to reduce this time and improve test results.

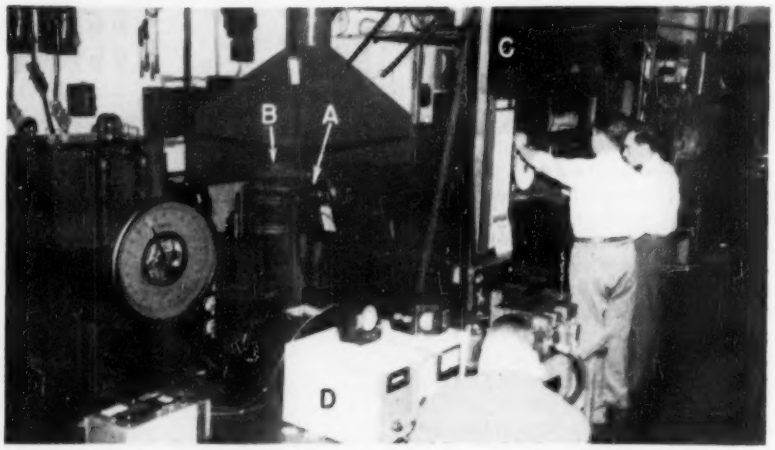
Wright's first trial was with a jet engine main shaft silver-graphalloy oil seal installed in a special test rig. Purpose was to see if extremely small wear, normally not measurable, could be accurately determined by monitoring the oil flow through or past the oil seal.

Several silver graphalloy oil seal rings were irradiated in the Atomic Energy Commission's Brookhaven Laboratory reactor for one week, after which the concentration of the material—radioisotope silver 110—was considered adequate.

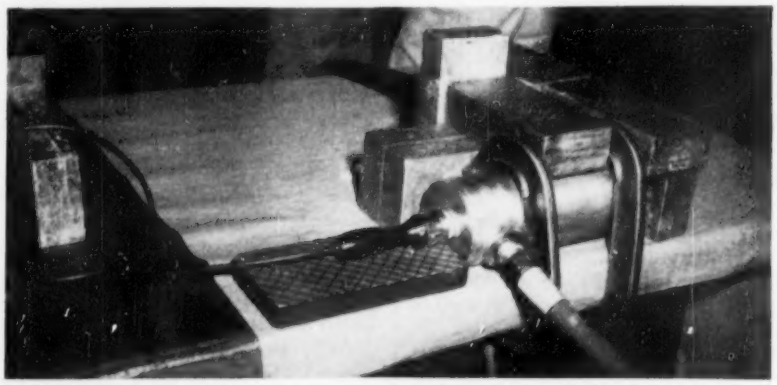
▶ **Test Setup**—The test oil seal assembly embodied three metal spacers forming the body of the seal. The two outside steel members were hardened and lapped. The inner section consisted of a cast iron ring and expander assembly flanked on each side by a silver- graphalloy ring, with the irradiated unit on the oil side of the assembly.

The test rig was designed to simulate running conditions of a typical Wright turbojet main shaft oil seal, with operation over a wide range of surface speeds and oil pressures. For this first test, speeds up to 10,000 rpm. and pressures up to 70 psi. were used.

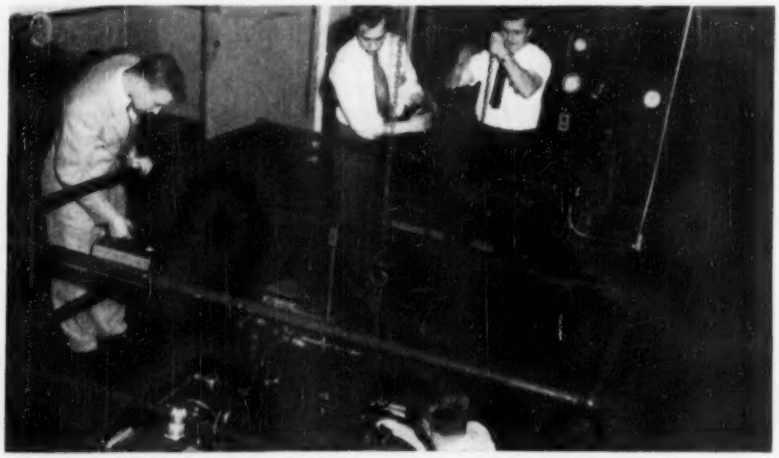
Special equipment included a bypass oil system so that the oil passing out of the seal cavity could be carried through



RADIOACTIVE RING in turbojet oil seal wear test rig (A) is shielded by lead stack (B) to decrease radiation through cinder block wall at rear. Control panel (C) also is lead shielded. Wright engineer checks meter (D) counting radiation level of oil.



GEIGER-MUELLER tube measures oil radioactivity picked up from seal ring wear. Connection (left) leads to count rate meter.



SHIELDED STORAGE PIT holds irradiated ring material until it is ready for test rig.

a chamber containing a Geiger tube. Readings were taken on a Geiger counter decade scaler. Portable survey meters, film badges, and dosimeters were used to safeguard engineers conducting the test.

Other precautions included personnel education by AEC-supplied movie films and coordination with plant safety and insurance representatives. The first test and handling procedure was observed by a nuclear engineer from the Brookhaven Laboratory.

▶ **"Hot" and "Cold"**—Indications of minute wear were apparent very shortly after the test started. Readings on the activity of the oil were taken at two-minute intervals throughout the run, and the increased radioactivity was plotted against time, the slope of the curve representing the wear rate. This slope was found to be very sensitive to changes in operating conditions. It was evident that conditions promoting excessive ring wear could be detected readily.

The test procedure involved operation in increments of 2,000 rpm., with a range of pressures covered at each speed. Testing was concluded at 10,000 rpm. and 70 psi., when wear became excessive, Wright reports.

The program was repeated using an identical "cold" (not radioactivated) ring to determine if the first ring had been damaged in any way during the irradiation process. Visual inspection at the conclusion of the second test indicated that the two rings had worn comparably.

A later test will determine the absolute rate of wear, in milligrams of material per unit time.

▶ **Other Materials**—Other runs of radioactive seals are contemplated for the immediate future with a new and higher speed rig. An early trial will involve a copper-graphalloy ring, similar to the one already tested.

Because of the short half-life of copper-64 (12.8 hr.) compared to silver-110 (270 days), this test was deferred until the testing technique could be checked out.

The copper material's short half-life (time required for a specific radioisotope to lose half of its initial activity) will necessitate a somewhat tight schedule of irradiation and testing.

Still another test is planned for a low-friction, low-cost alloy.

▶ **Benefits Seen**—Wright considers this method of testing for wear as having advantages over previous techniques because of its extreme sensitivity. As experience is gained, it is felt that testing times will be reduced greatly, opening the door to better data, lower cost, and greater test stand utilization.

Wright plans to give the technique an expanding role in aircraft engine development. —IS

ON LAND, SEA AND AIR

LORD Flexible Couplings

TRANSMIT THE FULL POWER OF BOEING TURBINE ENGINES

HERE again you see at a glance Lord versatility in designing bonded-rubber components for a wide diversity of machines. The photo at top right shows the Boeing Gas Turbine-Driven Truck-Trailer for heavy cargo hauling. At the top left you see a United States Navy personnel boat driven by the Boeing Gas Turbine Engine. Directly beneath is the Kaman Helicopter powered by the Boeing Gas Turbine Engine; details are clear in the foreground. The Lord Bonded-Rubber Flexible Coupling designed for the job transmits the power in each machine.

Special requirements like these reach satisfactory and economical solutions at Lord, Headquarters for Vibration Control. We invite you to take advantage of more than a quarter century of design experience and craftsmanship.

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Naturally...

McCulloch selects

Franklin POWER

Almost everything about the McCulloch MC-4 helicopter is new and highly efficient. Naturally, when it came time to choose the engine for this advanced helicopter design, McCulloch turned to the most experienced hands in the business – Aircooled Motors, Inc. – for a Franklin engine which would match their airframe in efficiency.

The MC-4 is the first tandem rotor helicopter to be certificated by the CAA. It is in production in evaluation quantity for the U.S. Army and Navy. Plans for commercial production are being formulated.

Wherever they go, whatever duties are assigned to them, McCulloch helicopters can count on dependable, efficient power from their Franklin engines. Franklin engines have earned their position as standard equipment in 4 out of the 5 CAA-certificated helicopters under 400 h.p.

AIRCOOLED MOTORS, INC. SYRACUSE, N. Y.

Fatigue Testers From Germany

Fatigue testing machines manufactured in Germany, for use with large aircraft components, are now being introduced to airframe builders in this country.

Built by Losenhausenwerk A. G., the units provide for tensile, compression and bending tests under static, fluctuating and alternating loads. Largest standard size exerts a 200-ton static and 100-ton dynamic load.

Feature of the machines is a device for the creation of pulsating forces at any one of four frequencies. The pulsator can be used with specially designed individual testing cylinders for static and dynamic loading of wings and other large structures.

Other features include indication of load limits, automatic constant-load regulator, counter for number of load applications, and a safety stopping action when the specimen breaks or load varies beyond the selected limits.

The machines are reported to have many years of successful use on the European continent and in England. Distribution and servicing here is through Kurt Orban Co., Inc., 205 E. 42nd St., New York.

Losenhausenwerk's chief engineer, Bruno Jacoby, is now touring the U.S. to study testing problems of American industry, with special emphasis on aircraft phases. During this trip, his headquarters are at Orban.

BIG DUCT

An indication of how glass-reinforced plastics are being drafted for large aircraft jobs is this heating duct for Chase Aircraft Co.'s C-123B cargo hauler. Duct is 106 inches long and weighs only 1.59 lb. Molded of Plastrong reinforced plastic by Bassons Industries Corp., 1432 West Farms Road, New York, unit has a glass fabric filler coupled with a polyester formulation.

Will the product you plan to make...

..... need

an alloy so tough you may not yet have heard of it?

..... require

a forged finish like plate glass?

..... face

a man-made inferno?

You may even have a twist or two of your own to add to the problem the Jet Division helped solve for jet aircraft engine builders . . .

The "buckets" (paddles) on the turbine rotor at the rear of a jet engine whirl around about 10,000 times a minute, pulsed by a white-hot blowtorch of flame. To withstand this roaring inferno, the bucket surfaces and curves must be forged even smoother than glass. They must be made of an alloy tougher than the toughest steel. They must "take" this red-hot ride for hours without stretching out, or "creeping", from centrifugal force and heat.

The Jet Division makes more buckets for America's engine builders than any other manufacturer. We forge super-strength alloys into finished parts so smooth and accurate that they need no costly, lengthy finish-machining or polishing.

If your product or product-to-come must meet one of these conditions . . . two . . . three, or, even a brand new one, it can pay you to get in touch with us now.

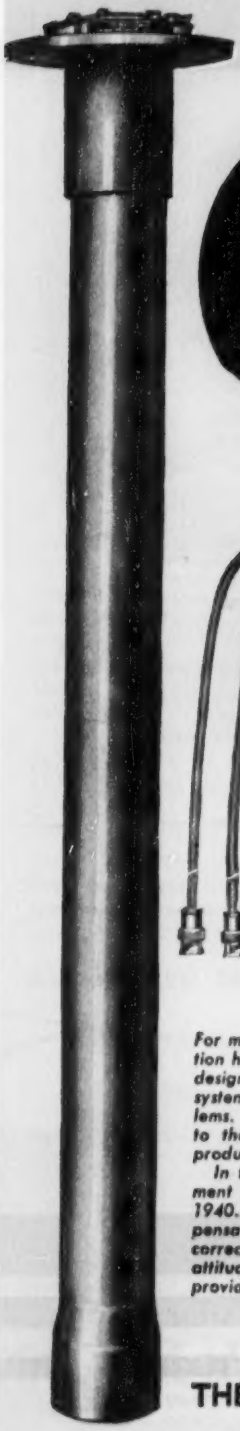
JET DIVISION

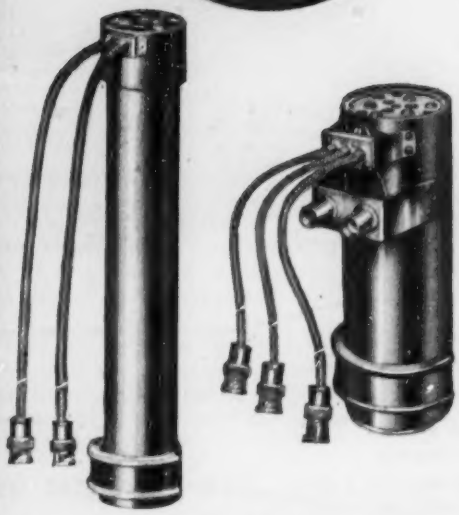
Thompson Products, Inc.

CLEVELAND 17, OHIO

LIQUIDOMETER Gravimetric and Volumetric Liquid Measuring Systems

Capacitor Type





Liquidometer capacitor type fuel quantity measuring systems feature the simplest and most fundamentally straight-forward circuits.

These systems can provide individual indication or totalizing of fuel volume or weight, low level warning, fuel transfer switching, airplane center of gravity control and other auxiliary functions.

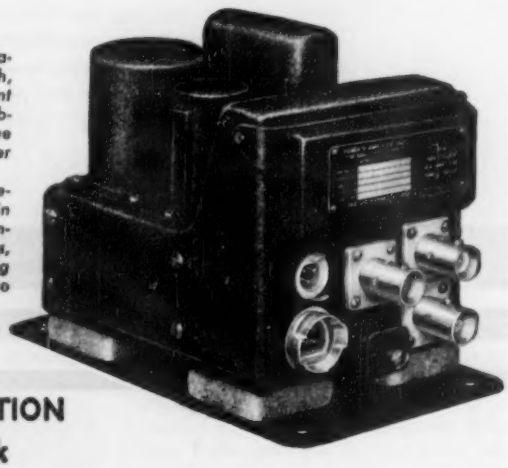
One type measures the weight of fuel based on an assumed relationship between its density and its dielectric constant. Another type is independent of fuel dielectric constant and is the only system which really gives "true" fuel weight indication. This type automatically combines the volume as measured by tank units and a dielectric reference condenser, with density as measured by a Liquidensitometer. An uncompensated type is also available.

If desired, Liquidometer fuel weight measuring systems can be arranged to provide volumetric "full' tank indication, regardless of the type fuel or its temperature. This feature is of material benefit during ground or airborne refueling operations.

Indicators, power units and tank units are rugged, compact and are of lightweight construction. They combine the features of sound progressive engineering, expert workmanship and best quality materials.

For more than three decades The Liquidometer Corporation has concentrated almost exclusively on the research, design and manufacture of liquid quantity measurement systems and the attendant installation and service problems. This specialization has proved to be of great value to the aircraft industry which has used Liquidometer products extensively since 1929.

In the capacitance method of fuel quantity measurement Liquidometer started extensive research back in 1940. It was the first to recognize such needs as compensation for fuel dielectric and density differences, correction for variations in fuel levels caused by varying attitudes of aircraft, and tank unit characterization to provide uniformly spaced indicator graduations.



THE LIQUIDOMETER CORPORATION

Long Island City 1, New York

Folland Pins Hopes on Lightweight Gnat

Day interceptor would match the MiG at one-fourth the cost of the Hunter; gross weight is 5,350 lb.

By Nat McKitterick

(McGraw-Hill World News)

Southampton, England—A current victim of the RAF's "quality not quantity" fighter development program is William Edward Willoughby Petter, designer of the very successful English Electric Canberra.

Petter, now managing director of Folland Aircraft, Ltd., near here, is designing Britain's first "light fighter," the Folland F.O. 141 Gnat. As a private venture into the possibilities of weight-saving—the Gnat's gross weight will be 5,350 lb.—the project has aroused much interest here and with NATO officers in Paris. But so far, the people who buy aircraft haven't been persuaded. Perhaps they will by the time the prototype Gnat flies a year from now.

Compared with similar projects now going on in the U. S. (AVIATION WEEK Apr. 27, p. 30), Petter is aiming at somewhat lower performance standards. At the same time, he's more concerned with production economies, a very much neglected sales point in the United Kingdom and on the Continent.

▶**Gnat Performance**—Petter's design is for a good-weather, day interceptor in the MiG-15, Sabre or Hunter class with, perhaps, a somewhat better rate of climb. This means maximum speed in level flight in the high Mach 0.9s, or over Mach 1 with afterburning. It means an operating ceiling over 50,000 ft. and endurance near that height of an hour-plus (or half that with afterburning). The rate of climb is pitched high—to 40,000 ft. in 5¼ min. (rate is twice as fast with afterburning).

This design spells low wing-loading—not more than 40 lb./sq. ft. With a wing span of slightly more than 20 ft. that means a wing area of about 130 sq. ft. The wing will be swept, but not so radically as some—about 40 degrees. The thickness chord ratio will be low, between 6% and 8%. The aspect ratio will be 3.24. The fuselage will be slightly less than 28 ft. long, 3 ft. 4 in. deep, and 4 ft. 7 in. wide. A tailplane, fully swept and 8½ ft. in span, is mounted above the wing.

▶**Easier to Make**—Petter is using only conventional materials. He has reduced machined members to a minimum and practically eliminated forgings and large castings. He claims the aircraft can be manufactured on the simplest of jigs, without any special tooling or skilled labor.

The designer feels that with a quantity order for, say, 500 Gnats, he could produce the airframe for a quarter of the cost of a Hunter or Swift. His prototype wing, now on static test, was built in 1,500 manhours or one-fifth the time it takes the same company to build a Swift wing. And manufacturing floor space needed for the Gnat airframe would be less than one-third that needed for a conventional fighter.

Petter claims he saves almost all his pounds by reducing structure weight. Take a wing for example. It is bolted together as one piece, with a torsion box bridge carried on spigots in a recess in the fuselage. This avoids special spar frames or root ribs. The wing skin is thick with close, spanwise extruded stiffeners and doubler plates inboard. The leading and trailing edges are lighter, but conventional. Pressure-balanced spring-tab ailerons are inset in the wing.

▶**Tight Fit**—Much weight was saved by reducing all extraneous space in the fuselage. Dimensions were determined by literally wrapping the fuselage around a hypothetical pilot.

The fuselage, of which there is only a mock-up in evidence now, will have a long slender nose with a large plastic bubble over the cockpit. The sides of the fuselage bulge under the leading edge of the wing, allowing for engine intakes. These bulges continue all the way to the tail.

The cockpit, though small, seems up to conventional standards of safety and comfort. It is armored fore and aft, covered with a hood which hinges up and aft, and provided with cabin temperature and pressure control. There is an ejector seat, a light model designed by SAAB of Sweden, weighing only 70 lb. as against 180 lb. for the conventional Martin Baker seat.

The prototype Gnat will have a special Dowty undercarriage, main wheels retracting into the engine intake fairings, while a nose wheel folds up behind the seat. The main wheels can be partially lowered to act as airbrakes. Tire pressures will be set at 100 psi., making grass operation possible.

The only hydraulic equipment besides the undercarriage will be the tailplane movement—(5 deg. up or 15 deg. down). The Gnat will not have flaps. The tailplane is mounted on a small dorsal fin with a rudder fairly close to and aft of the jet orifice.

Folland's Petter

William Edward Willoughby Petter, managing director of Folland Aircraft, Ltd., Hamble, Southampton, is the designer of the F.O. 141 Gnat light interceptor. He was chief engineer, aircraft division, of the English Electric Co., Ltd., where he designed the Canberra twin-jet bomber. His aviation experience goes back to 1929, when he was apprenticed to Westland Aircraft Works.

▶**Engine Problems**—Petter's biggest headache has been an engine for the Gnat. The prototype will fly with an Armstrong Siddeley Viper, officially rated at only 1,640 lb. thrust. This is, of course, far too little power for the Gnat's designed performance.

Petter wants to come as close as possible to a pound-for-pound thrust/weight ratio for the Gnat. That means an engine weighing about 800 lb. with a thrust of more than 4,000 lb. The Bristol Saturn would have been perfect, but this development died last fall when government cut off funds.

Since then Petter has investigated and discarded two Turbomeca engines—the Ossau (axial) and Marbore (centrifugal); a slenderized Rolls-Royce Derwent (which Rolls could not develop now); the Westinghouse J40 (too long), and others. While the situation is still very much in the air, best bet is that a beefed-up Viper with afterburning will prove acceptable.

▶**How Much Equipment?**—Outside the engine, Petter's toughest problem has been equipment. Putting on too much equipment, in deference to the whims of procurement officers, would com-

pletely defeat his design aims. Too little equipment might mean his project would die aborning for lack of government support.

Petter argues, of course, for the lightest and simplest navigational and search equipment. In fact he isn't anxious to do much more than equip the Gnat with the same instruments used on the wartime Spitfire. He'd like to settle for VHF radio and a double DME for navigation. The nose is long enough to take a radar range set if necessary.

Petter sees Gnats flying in swarms, and therefore susceptible to being guided on to target by improved ground radar. Or, perhaps, a "master fighter" technique could be developed whereby an electronic monitor like the Gloster Javelin could be used to guide the Gnats to the enemy.

As for landing, it is suggested that perhaps one-man GCA equipment such as ECKO's might be used. The Gnat, while probably landing at a fast clip, shouldn't need much room.

In armament, there is also much room for flexibility. At present, plans are for two 30-mm. Aden guns mounted in the engine fairings, on drag center to avoid pitching. The links would be collected in the rear of the fuselage with a special mechanism being developed by Petter. But the Gnat's high wing should certainly be capable of taking rockets, small bombs or other missiles.

▶ **Who Will Buy?**—Petter's battle for recognition for the Gnat is far from won. Officials of the Air Ministry, particularly Sir Basil Embree, commanding the Fighter Command, have shown much interest. But the Ministry of Supply, which actually places orders, has been conspicuously disinterested.

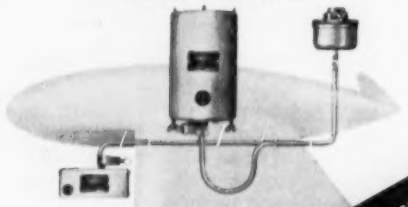
Meanwhile, Petter is pushing his project on the Continent where the price of modern fighters is out of all proportion to the size of national economies. And from NATO he has received the blessing of many on Gen. Lauris Norstad's staff who think quantity fighter protection in Europe is just as necessary now as it ever was.

IN-FLIGHT REFUELING THE F-84

Mighty Republic Thunderjets are flying all over the world—equipped with "in-flight" refueling warning controls by Aircraft Controls Company, division of Gorn Electric.

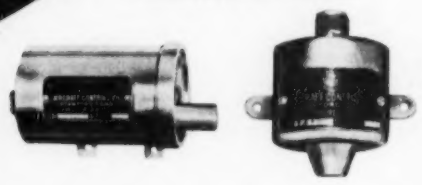
Tens of thousands of single and dual fluid level controls, differential and absolute pressure switches, and many other similar devices have been supplied to such outstanding aircraft manufacturers as Republic, Chance Vought, and others, as well as the Air Force and the Navy.

FLOAT SWITCHES



WARNING CONTROLS

PRESSURE SWITCHES



These are two of a number of pressure switches developed by Aircraft Controls Div. to meet all jet aircraft requirements. Our engineering department will be glad to translate your requirements into finished products. Don't hesitate to consult us.

AIRCRAFT DIVISION CONTROLS

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STAMFORD CONNECTICUT

EST. 1923

WEST COAST REPRESENTATIVES: Western Aircraft Supply Co., 8845 West Olympic Blvd., Beverly Hills, California

Alcoa Breaks Ground For AF Heavy Presses

Ground has been broken at Aluminum Co. of America's Cleveland Works to receive two of the forge giants being built under the Air Force heavy press program. Grading, clearing and concreting over more than 26 acres have been started for buildings, railroad and yard areas. The presses are to be the 50,000-ton Mesta and the 35,000-ton United press, which are scheduled for operation in January 1955.

Main building for the new Alcoa operation will be more than 100 ft. high over the press bay and will have about 532,000 sq. ft. under roof. The building will be 1,083x480 ft. A boiler house and outdoor die-storage area will be adjacent.

Supporting the heavy presses and the plant will be almost 17 mi. of 10¾-in. concrete filled steel piling sunk 70 to 100 ft. to bedrock.

Total cost of the plant, scheduled for completion in the middle of 1954, will be $40 million. Alcoa plans to spend several additional millions on supporting facilities.

New Unit to Draw Large Size Tubing

New equipment now under construction will boost the size of metal tubes that may be cold-sized by compression forming from the present 6¼-in. outside diameter to 18-in. o.d. Tube Reducing Corp., Wallington, N. J., is making the machine.

The company reports that the development of larger aircraft, rockets, jets and military items has boosted the demand for larger-diameter, light-wall, precision, seamless tubing. The items produced on Tube Reducing's existing smaller machines are used in the manufacture of Rato and rocket bodies, steel

cores for prop blades, copter spars, braces and struts for landing gear and flap controls.

The new machine will be used to produce seamless tubing up to 17 in. in diameter. Wall thickness will be equal to or less than .125 in. in the 10-in. tubing, .175 in the 14-in. tube, and .200 in the 16-in. size. The machine will use dies weighing more than 7,500 lb., several sets of which already are being processed at Midvale Co.

The company reports the equipment will process carbon and alloy steels, aluminum, copper and brasses, stainless steel, titanium and other metals. Zirconium and its alloys also have been compression-formed successfully.

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., wheel & brake assy., 40 ea., 2 ea., 40 ea., $128,443; wheel assemblies, 398 ea., 495 ea., 314 ea., $84,771.

Bendix Radio Div., Bendix Aviation Corp., Baltimore, radio compass, 9,000 ea., $56,595.

Beseler Co., Charles, 60 Badger Ave., Newark, N. J., projector, 150 ea., 1,618 ea., $442,885.

Breeze Corps., Inc., Newark, N. J., box assembly, 212 ea., plate lock, 32 ea., motor clutch pack assembly, 25 ea., $37,643.

Busch Camera Corp., 500 S. Clinton St., Chicago, mount, 1,396 ea., spares, data, $59,197.

Cannon Electric Co., 3209 Humboldt St., Los Angeles, solenoid for rocket jettison, 3,130 ea., $40,439.

Champion Spark Plug Co., 900 Upton Ave., Toledo, aircraft spark plug, 105,930 ea., $158,895.

Codman Co., F. L. & J. C., Plain St., Rockland, Mass., banner tow targets, 12,000 ea., 5,000 ea., 5,000 ea., $401,150.

Continental Aviation & Engineering Co., Detroit, turbojet engine, 14 ea., $100,000.

Cutler-Hammer, Inc., Milwaukee, switches, 376 ea., 64 ea., 4,537 ea., $31,009.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., generators, 109 ea., 11 ea., 169 ea., $140,543; indicator, 40 ea., 4 ea., 35 ea., $84,911; transmitter, 210 ea., 10 ea., 232 ea., $76,989.

Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N. J., direction finder set, 52 ea., $1,000,000.

General Electric Co., 1 River Rd., Schenectady, N. Y., indicator, 7,307 ea., $716,488; indicator, 2,273 ea., $227,271; 800 ea., $76,200.

General Tire & Rubber Co., 1708 Englewood Ave., Akron, wheel assy., 158 ea., 8 ea., 45 ea., $46,307.

Gill Electric Mfg. Corp., Redlands, Calif., aircraft batteries, 3,914 ea., $184,192.

Goodyear Tire & Rubber Co., Inc., 1144 E. Market St., Akron, wheel assy., 420 ea., 20 ea., 270 ea., $181,695; 375 ea., 50 ea., 55 ea., $760,651; wheel assys., brake assy., $667,701.

Gould-National Batteries, Inc., Depew, N. Y., aircraft batteries, 5,523 ea., $233,346.

Gremco, Inc., 3535 N. Sylvania St., Ft. Worth, generator, 30 ea., power units, 120 ea., rectifiers, 120 ea., $4,717,872.

Grimes Mfg. Co., Urbana, Ohio, light assys., 1,180 ea., 950 ea., 1,272 ea., $34,145.

Hartman Electrical Mfg. Co., 175 Diamond St., Mansfield, Ohio, cut-outs, reverse current, 2,262 ea., 228 ea., 1,254 ea., $97,456.

Vectron, Inc., 235 High St., Waltham, Mass., radar assembly, 24 ea., $376,356.

Wells-Gardner, 2701 N. Kildare Ave., Chicago, radio receiver, 121 ea., mounting 103 ea., 6 ea., $139,037.

(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

By far the biggest question mark in commercial aviation today is America vs. Britain in the jet transport field.

To one airline project engineer, the important point is that jets are here. The British have an airplane in operation.

"The payoff comes from actual operating experience," he said. "Talk about better American operating know-how, design know-how, production knowledge, research facilities and any other type of approach cannot substitute for an airplane a crew can step into and take off."

Acknowledging this premise, the question appears to be whether U.S. manufacturers can overtake the British. My English friends say no. They point with sound argument to the British types under development, the Conway engine designed for transport operation and prices ranging from $1,500,000 to $2,000,000 for the Comet III, while our people are talking in the $3,500,000 to $4,000,000 bracket.

Yet one of our top operations and engineering experts insists that there are no inherent mysteries about jet transports, and that it would be easy to build a better one without delay. But he adds that there will be no widespread demand for jets until someone – either American or British – is able to build a turbine-powered aircraft that can pay its own way.

This, the Britishers contend, is merely an excuse for dropping the ball, so to speak. They admit the operating economy of the Comet I is not satisfactory, but they point out that Comet II will be better than Comet I, and Comet III better than Comet II. And in the future is Comet IV.

One oft-quoted reply points out that American-built transports today dominate the world because we have always produced airplanes that can bring profits to their owners, that when we are ready to deliver jet transports they will be able to make money as well as headlines.

Foremost in the American field are the three top transport manufacturers, Boeing, Douglas and Lockheed. Typical average for the initial American jet liner, it is said, will include a cruising speed of better than 515 m.p.h., a range of more than 3000 miles and a capacity of 100 to 130 passengers. The Comet III's expected performance is a 500 m.p.h. cruising speed and 2700-mile range with 58 first class passengers or 78 tourist class.

But the Comet III is expected in 1956; whereas, American production is not expected to start until about 1958. Let the British ship prove that it can approach the passenger-mile or ton-mile economy of present piston types, and U.S. manufacturers will have their work cut out for them, especially in view of orders already in for Comets.

Americans point out that the British government foots the bill for development, and is evidently willing to lose money in the operation of jet transports in a pioneering program that brings prestige to British products. America's air transportation, on the other hand, is regarded as a commodity that must be sold in competition with other forms of transportation.

This is a sound comparison and there is no doubt that we would be in much better competitive position if the government had helped our manufacturers.

So it boils down to two methods of operation. The British are learning by experience and we by watching their operations and studying their experiments.

By careful analysis, by learning whether anticipated solutions are correct before decisions are made, American manufacturers hope to make time in the catch-up process. In this way, perhaps American designs will hurdle a big portion of the development period.

I think it's obvious that the British lead is considerable, far from the ephemeral thing it was purported to be.

But I still feel that American jets, when they come, will be close on the heels of our competitors, if indeed they are not neck and neck or even better.

Our manufacturers are facing up to the real threat of British dominance, moving on their own to overhaul an adversary that was sprung out ahead on the financial catapult of subsidy.

In the end, I am confident we will mix production facilities, engineering skill and ingenuity with shrewd use of Britain's pioneering solutions to achieve equal performance with greater payload at comparable plane cost.

But let's face it – it'll take a lot of doing!

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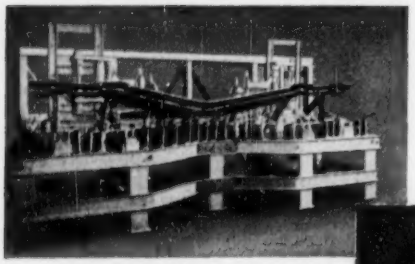
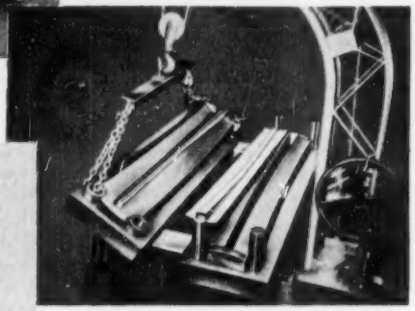
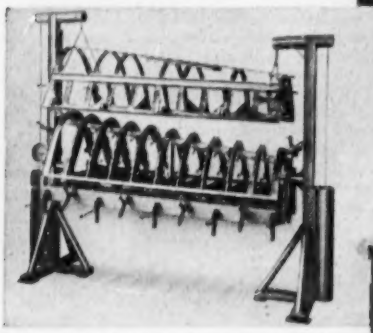
TWIX, with over twenty years in aircraft tooling, offers its Engineering staff, Experience and Manufacturing facilities for the development of your Tooling Program. One of the largest tool and die plants in the East, TWIX has produced tools, dies, jigs, and fixtures of *every type and size* to precision aircraft requirements and to the closest tolerances. TWIX services includes PROCESSING, coordination and tooling of parts, sub and complete assemblies — individually or collectively. *Staffed by Professional Engineers.*



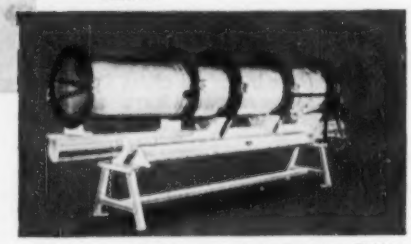
TWIX made Drill Jig & Locating Fixture: Drills the rivet holes and Locates and Holds all parts that make-up the Main Beam of the Aircraft. (Jig: 20′ long X 4′ wide X 10′ high)



TWIX made Die to make a Hat-Sectioned Longeron in one operation. Longeron Dimensions: 72″ long X 7″ wide having Double Contour.



TWIX made tool for Routing, Drilling and Assembly of a Turtle Deck. (6′ long, 4′ high, 3′ wide)



TWIX made tool for Locating, Welding and Riveting for assembly of Jet Tail Pipe. (20′ long X 5′ high X 3′ daimeter)

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Keystone Watch Case Div., Riverside Metal Co., Riverside, N. J., indicator, 19,512 ea., $271,230.

Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst, N. Y., indicator, 1,083, spares, 325, spare parts, $84,082.

Lewis Engineering Co., 339 Church St., Naugatuck, Conn., indicators, data, spare parts, 8,024 ea., $297,677.

Master Vibrator Co., 108 Davis Ave., Dayton, engine generator set, 741 ea., spares, 75 ea., spare parts, 1 lot, $1,712,446.

Mercury Trading Corp., 157 E. McMicken Ave., Cincinnati, transmitter, radio, 30 ea., coil, 30 ea., receiver, 12 ea., $26,490.

North American Philips Co., Inc., 100 E. 42nd St., New York, control panel, 538 ea., $86,875.

Phaostron Co., 151 Pasadena Ave., South Pasadena, Calif., relays, 3,063 ea., 667 ea., 1,204 ea., $125,392.

Radio Corp. of America, RCA Victor Div., Camden, N. J., intercommunication set components, $1,345,356.

Regent Jack Mfg. Co., Inc., 11905 Regentview Ave., Downing, Calif., hydraulic aircraft jacks, 1,039 ea., spare parts, maintenance data, 1 set, $860,962.

Republic Aviation Corp., Farmingdale, L. I., N. Y., training units, 4 ea., $1,219,364.

Stratford Pen Corp., 44 W. 28th St., New York, amplifier, 6,479 ea., $239,867.

Sunbeam Corp., 5600 Roosevelt Rd., Chicago, indicator, 4,871 ea., $488,999; 440 ea., $50,432.

Temco Aircraft Co., Dallas, modification of C-97 aircraft, 51 ea., $3,912,000.

V&H Electronic Industries, 2033 W. Venice Blvd., Los Angeles, transmitter, radio, 100 ea., $71,150.

Westinghouse Electric Corp., 32 N. Main St., Dayton, relay, 457 ea., $29,823.

Winder Aircraft Corp., P. O. Box 268, Winder, Ga., glass assys., 68 ea., 288 ea., $23,677.

Pako Corp., 1010 Lyndale Ave., N., Minneapolis, temperature control, 186 ea., spare parts, $164,228.

Red Bank Div., Bendix Aviation Corp., Eatontown, N. J., inverter, 745 ea., 74 ea., 462 ea., $83,216.

Navy Contracts

The following contracts were announced recently by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11.

Air Associates, Inc., Teterboro, N. J., actuators for F2H-2, -2P, -2N, -3 aircraft, $139,737.

American Optical Co., 14 Mechanic St., Southbridge, Mass., goggle sets, flying, $43,603.

Bendix Products Div., Bendix Aviation Corp., South Bend 20, Ill., strut assys. for F7U-3 aircraft, $260,521.

Bewley Engr. Co., 75 Station St., Southport, Conn., servo unit, 46 ea., $31,303.

Chicago Pneumatic Tool Co., 237 N. 12th St., Philadelphia 7, screwdriver, 284 ea., $26,128.

Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, strut assy. for JD-1 aircraft, 12 ea., $33,264; strut assys., $285,873.

Continental Screw Co., Mt. Pleasant St., New Bedford, Mass., screw, machine, flat head, 100 deg., structural, 23,930 gross, $34,601.

General Communication, 681 Beacon St., Boston, switch, coaxial, 322 ea., $48,300.

Lundy Mfg. Corp., 36-08 33rd St., Long Island City, N. Y., valve, 51 ea., $29,192.

New York Rubber Corp., 100 Park Ave., New York 17, watertight case, 45,252 ea., $195,994.

Print-O-Tape, Inc., Box 272, Route 176, Libertyville, Ill., tape, $65,182.

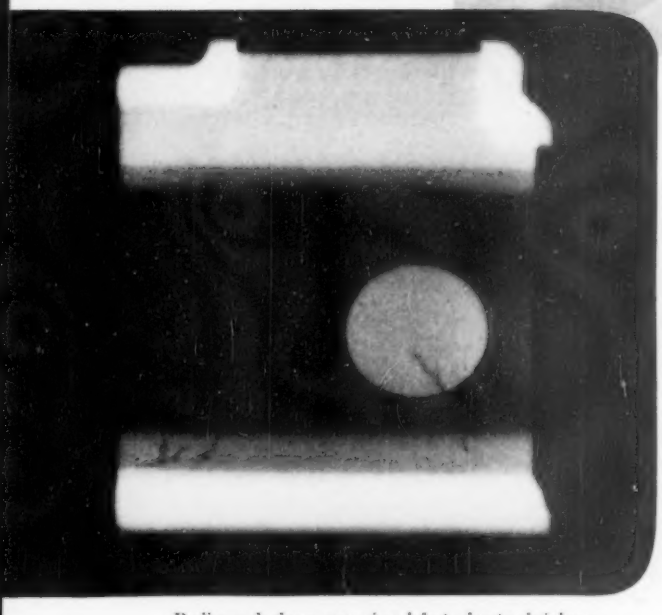
Solar Aircraft Corp., 2200 Pacific Highway, San Diego, parts, spares for PBM aircraft, $54,407.

Sperry Gyroscope Co., div. of Sperry Corp., Great Neck, N. Y., maintenance parts used on indicator & units, $26,197.

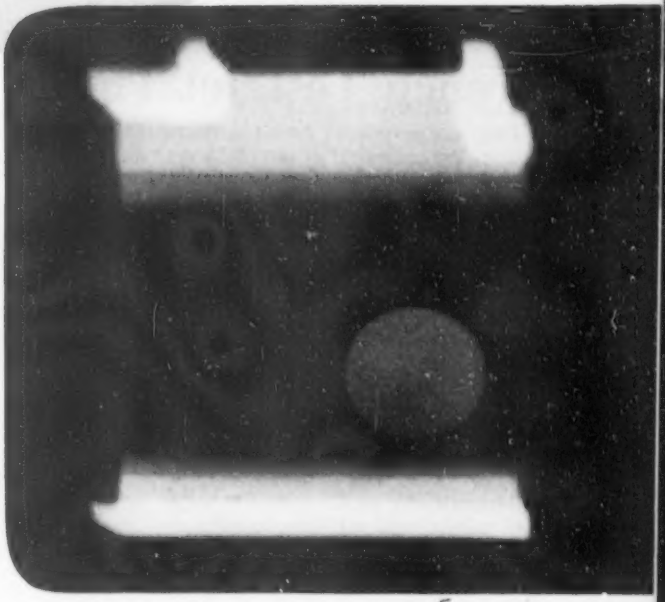
Vickers, Inc., 1400 Oakman Blvd., Detroit 32, power unit, 44 ea., $136,823.

When shrink occurs...

Yield shrinks, too...



Radiograph shows recurring defects due to shrinkage.



A change in gating produced sound castings.

Radiography helps avoid shrink

Shrink can pose a real problem in casting 355 aluminum. It did with this instrument housing.

But radiographs of the pilot runs showed a recurring pattern of defects. This suggested a change in gating which quickly corrected the difficulty.

This is a typical reason why more and more foundries are making full use of radiography. It proves the soundness of their work—helps build a reputation for prompt delivery of good castings.

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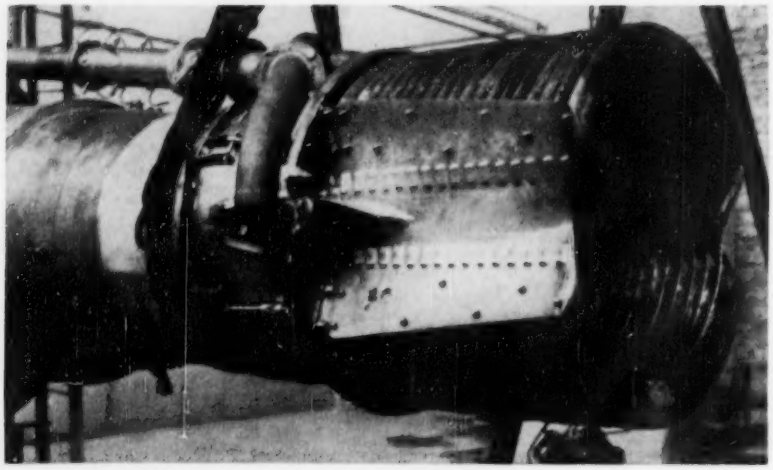


French Test Jet Thrust Reverser

First details of a jet deviator, which permits the equivalent of reverse thrust from a turbojet engine, have been made available to AVIATION WEEK.

The device, being flight-tested in a de Havilland Vampire in France, was developed by engineers at Snecma, the French nationalized aircraft engine factory (AVIATION WEEK Dec. 22, 1952, p. 15).

▶**Turning Vanes**—As had been surmised earlier, the device consists of a group of about 20 annular deflector vanes concentric with the thrust line and placed at the exhaust end of the tailpipe.

Normally the gas flow passes through the tailpipe without being greatly affected by the vanes.

In order to obtain the "reverse-thrust," a high-pressure jet of air is blasted into the center of the exhaust stream, forcing the main flow towards the sides where the vanes can catch it and turn it.

Thus the annular vanes act as turbine buckets do, and turn the flow. The reaction from the turning produces a thrust in a negative sense, braking the airplane.

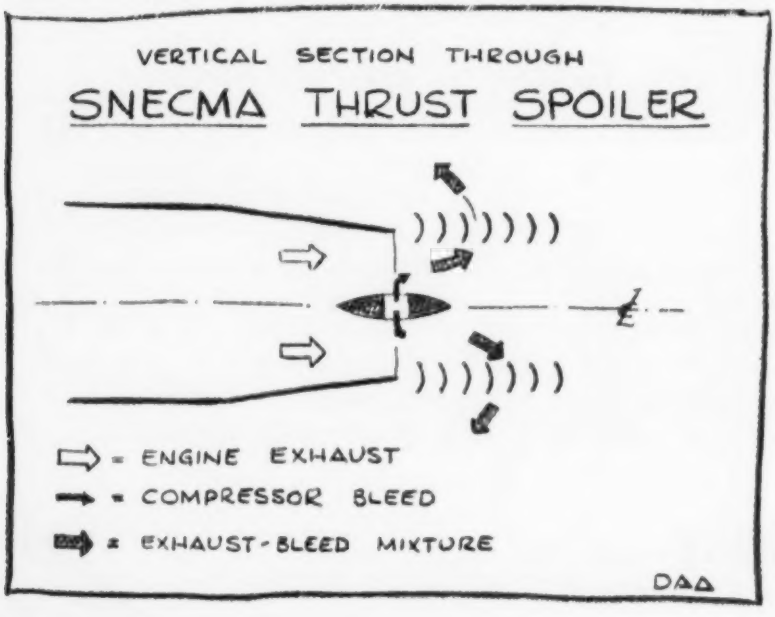
With the current arrangement, only 2% of the engine air mass flow is required to force the jet into the vanes. This airblast is bled from the compressor, and fed into the main exhaust stream through a diametral vane or a center body.

Negative thrust obtained with the unit is equal to about half the rated positive thrust of the engine.

▶**The Price**—There is still one hitch: When the reverse-thrust feature is not being used, the full thrust of the engine is reduced by as much as 10% because of the air bleeding through the vanes.

Snecma engineers developed the device and installed it on a de Havilland Goblin turbojet for testbed runs in the summer of 1951. Later that year the engine with the vanes was tested in the Chalais Meudon windtunnel. In February 1952 the unit was installed in a DH Vampire and test flights began in July.

The photograph shows the DH Goblin unit as modified and tested at the Suresnes plant of Snecma. Bleed air from the compressor is fed in through the center of the streamlined vane. The purpose of the plates which extend above and below the centerline of the vane is to prevent side thrust, and also to protect the twin booms of the DH Vampire in which the engine was installed. Presumably such plates would not be needed in a pod type of nacelle mounting, or in a conventional fuselage location of the turbojet.



Boeing Unit Fixes Old Tools Like New

A machine-tool rebuilding program at Boeing Aircraft Co.'s Wichita Division is now readying production tools at the rate of 17 per month.

Last year, Boeing's machine-maintenance department reworked 144 machines, kept the average cost of each to about 20% of its 1942 list price.

▶**How It's Done**—Using new methods and procedures, old and worn machines are restored to the manufacturer's original specifications. Interchangeability of parts in like machines is provided.

When a machine enters the rebuild shops, several teams go to work on it. One group of specialists tears it down and another group restores the ways—an operation requiring tolerances of less than .001 in. Surfaces are evened off by a hand scraper capable of shaving off pieces of case material as thin as .0001 in. Frequently the ways are rebuilt with a resin-base absorbent plastic which eliminates defacing by chips.

A third group overhauls the gearboxes and transmissions, and fourth group reassembles and tests the machines.

During the rebuilding process, many of the machines are modernized. Individual oil cups, for instance, are replaced by an up-to-date one-shot oiling system.

▶**Early Start**—Boeing started the project from a pilot plant operation in September 1949, after it had reopened the World War II B-29 plant for the production of the B-47 Stratojet.

The government-owned stored tools that were made available needed rework badly, and for the high-precision work

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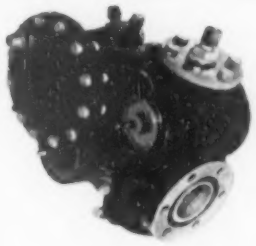
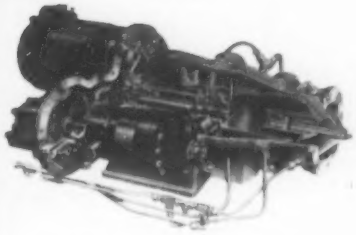
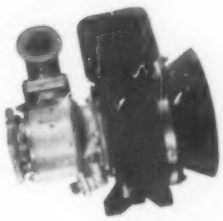


Supersonic ramjet engine power control.

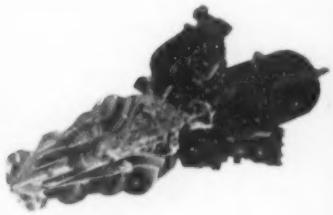


40 HP turbine driven unit, supplying electricity and hydraulic power.

Advanced design fuel nozzle for ramjets and afterburners.



Air turbine driven fuel pump.



50 HP turbine driven unit, supplying electricity and hydraulic power.

marquardt air turbine accessory drives and thrust controls for missile and aircraft power plants are the outgrowth of more than 8 years of research and development.

marquardt has created a new "Accessories Division" to facilitate mass production of these units for missile application.

marquardt, pioneer in ramjet and afterburner research and manufacture, has new engineering manuals concerning these illustrated accessories. We'll be glad to send you a copy.

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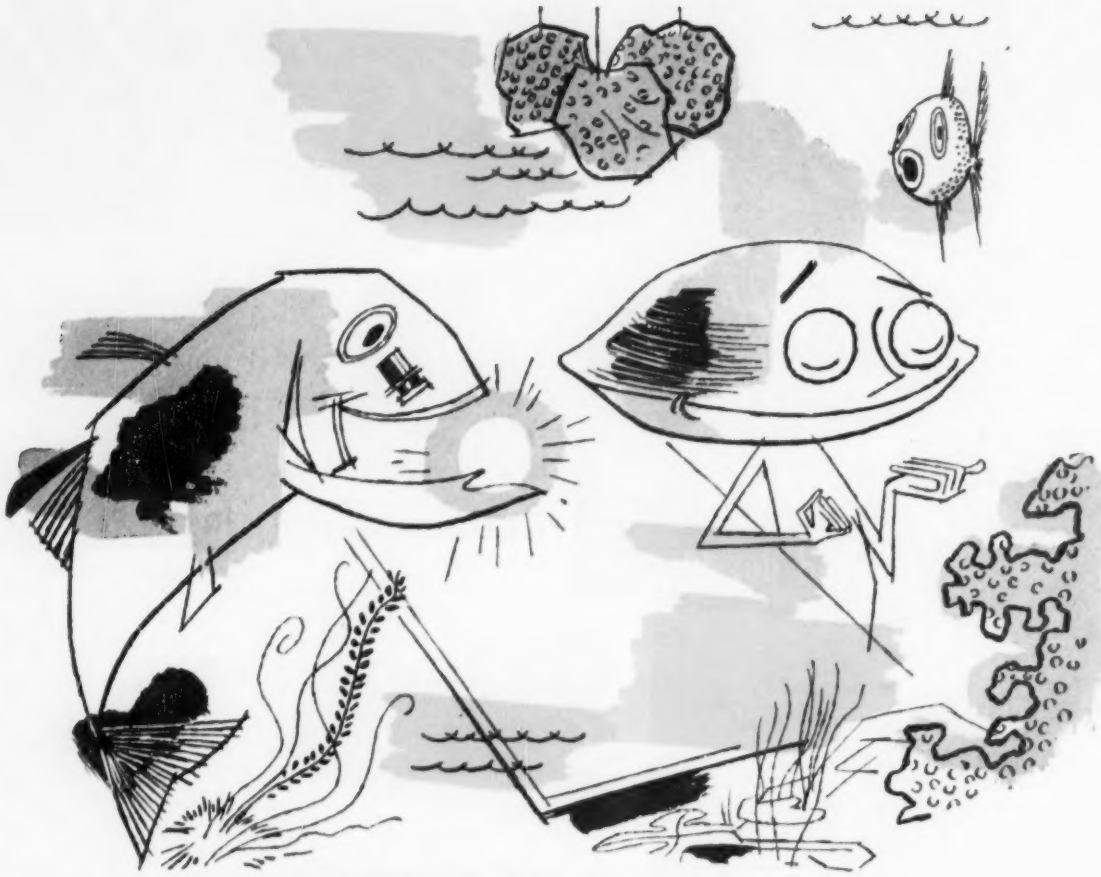

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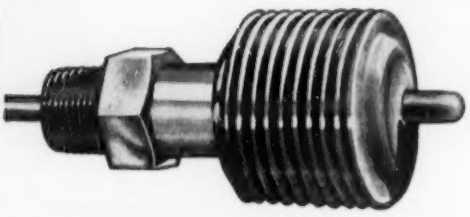

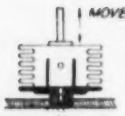

MOVEMENT **Thermostatic Motor**—This type of assembly is widely used in temperature regulators, etc., where a thermostatic charge is confined in the bellows and where a valve, switch, damper, etc. is to be operated in response to temperature changes.

● Take bellows assemblies, for example. Designing and producing them is a specialty at Fulton Sylphon and Bridgeport Thermostat. Has been for over a half-a-century. So it's only natural that so many users of bellows assemblies come to us.

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Fulton Sylphon and Bridgeport Thermostat specialists produce bellows assemblies for every requirement—for use as flexible connectors; for thermostatic devices, pressure controls, hydraulic mechanisms and other uses. Wide range of metals and sizes. Find out how we can help you on your present or projected requirements . . . help you make substantial savings. And for useful ideas, write for Catalog LA-1400.

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TEMPERATURE CONTROLS • BELLOWS ASSEMBLIES • BELLOWS DEVICES

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DIVISION
Bridgeport 1, Conn.

involved could not be used without rebuilding. However, Boeing couldn't send the tools back to the manufacturers because of the work load the latter had, which would boost the repair time. So the aircraft manufacturer undertook the job itself.

Boeing's Seattle plant has a similar machine tool rework program underway, although on a smaller basis.

PRODUCTION BRIEFING

▶ **Temco Aircraft Corp.,** Dallas, has been awarded a multi-million dollar contract to modify 50 Boeing C-97 Stratofreighters to flying hospitals. The firm also has received a contract from Pan American World Airways to modify two Lockheed Constellations to 70-passenger configuration.

▶ **Aviation Maintenance, Inc.,** 1101 Lee Highway, Arlington, Va., has been formed to overhaul and service engine accessories, landing gears, hydraulic systems and other aircraft components. President of the new firm is John H. Dale, formerly with Capital Airlines.

▶ **Boeing Airplane Co.,** Seattle, will institute a summer work schedule June 15 under which all shifts will be moved ahead one hour.

▶ **Swedlow Plastics Co.,** Los Angeles, makers of transparent monolithic and laminated plastic glazing materials for the aircraft industry, has acquired Sierra Products Co., Los Angeles, which has been developing production methods for Sierracin polyester materials.

▶ **Lockheed Aircraft Service, Inc.,** handled 4,102,975 work-hours of maintenance, overhaul and modification on 1,320 civil and military and commercial aircraft at its East and West Coast bases during 1952, an 11% increase over 1951. At LAS-Burbank, work broke down approximately 57% on jet fighter and trainer modification, 31% on overhaul and conversion of four-engine military and civil transports and the remainder on business aircraft. LAS-N. Y. handled mostly airline and business aircraft, with 54% entailing overhaul and modifications, 37% line maintenance and 9% tank sealing and overhaul of unattached conversions.

▶ **Hertner Electric Co.** recently opened a new plant near Cleveland which fits into program of expanding the company's line of small a.c. motors. The motors are said to be precision units suitable for use from the smallest instrument service to medium-power duty. Company address is 12690 Elmwood Ave., Cleveland 11.

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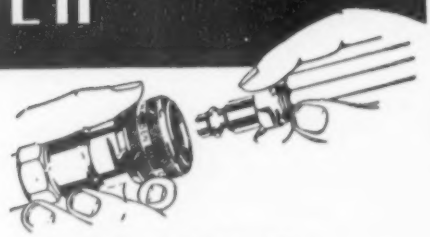
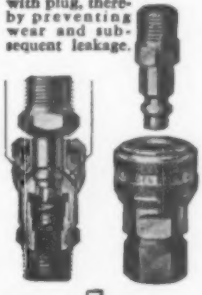


Locking pins in Hansen Push-Tite Coupling Socket afford large area contact with plug, thereby preventing wear and subsequent leakage.



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To connect a Hansen coupling, you merely push the plug into the socket. Flow is instantaneous.

To disconnect, pull back sleeve on socket—coupling disconnects. Flow is shut off instantly and automatically. No tools—no turning, adjusting nor twisting of parts required.

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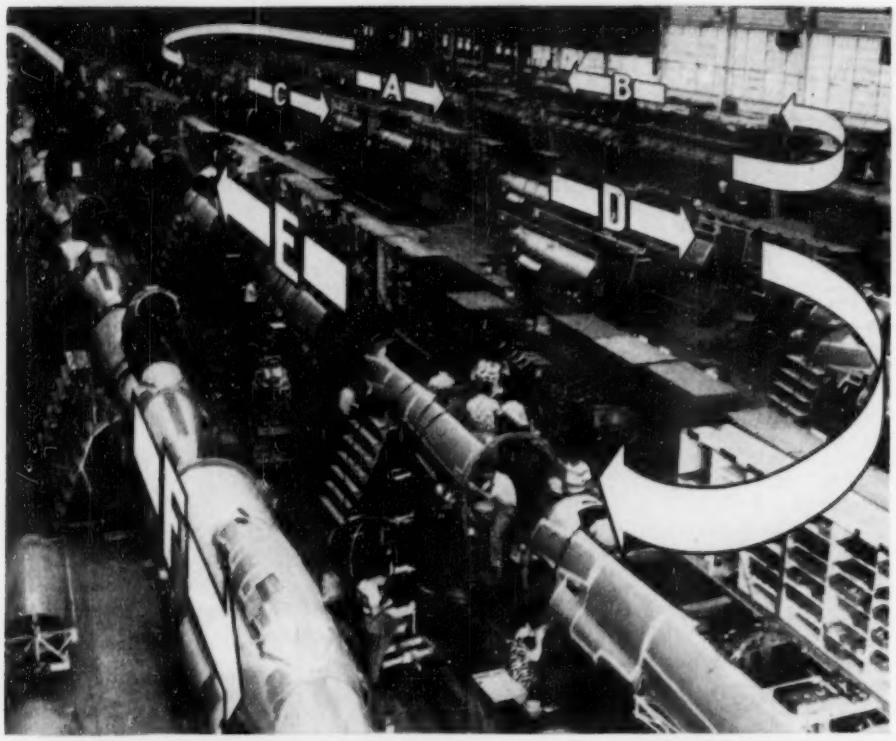
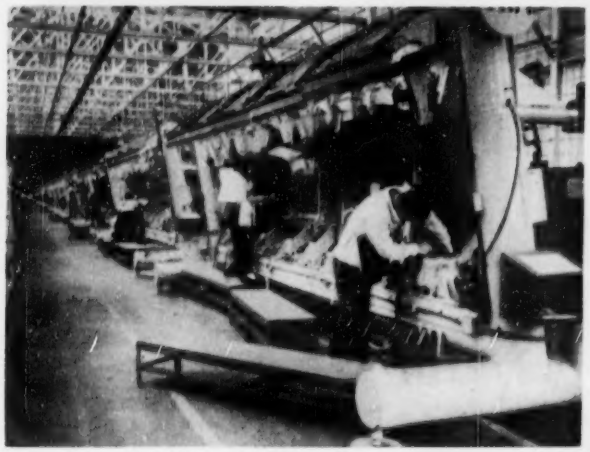
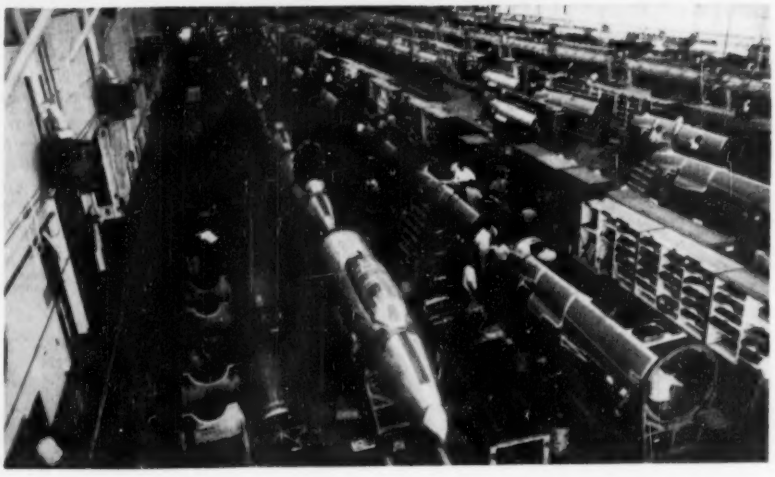


T-33s Snake Down the Line

1 Serpentine production line of Lockheed T-33 trainers starts "half shell" fuselage sections at (A) and swings them through the lines to mating station (D) where assembly of halves begins, and on to station (F) where job is completed. T-33s are used to train jet pilots for Air Force, Navy, Marines, and for air arms of France, Holland, Turkey, Greece, Denmark, Norway, Belgium, Portugal, Italy and Yugoslavia.



2 Both sides of right-hand half of T-33 forward fuselage section are worked in same assembly jig, as shown in two photos above. This is station (C) in picture 1.



3 End of line shows half shells combined in completed forward fuselage and ready for engines and mating with aft sections. Lockheed makes the T-33 at Burbank, Calif. Canadair, Ltd., also makes the trainer under license from Lockheed.

LOCKHEED "STARFIRE" SCORES WITH *Conditioned Brain Waves*

For split-second, precision operation of her radar-tracking and electronic automatic firing equipment, a high altitude all-weather interceptor must have constant pressure in her wave guides. These channels of communications between "brain" and equipment must remain properly conditioned for transmission of intelligence—a vital task performed by the Lear-Romec Pressurizing Pump illustrated.

As this jet tracks her target at supersonic speed, fresh oil-and-moisture-free air must be pumped into wave guides to maintain constant sea level pressure regardless of altitude. Originally developed for the Lockheed F-94C, the Lear-Romec Oil-less Pressurizing Pump illustrated does the job. Graphitar blades and bearings eliminate the need for lubrication, air supply is kept free of moisture by a dehydrator, and automatic maintenance of pressure is assured by an absolute pressure switch.

This and other types of pressurizing equipment made by Lear-Romec are now installed on almost every size and type of high altitude military plane using antenna wave guides and transducers.

Many new and highly specialized components for aircraft fluid systems are now available from Lear-Romec. For detailed information write for the new Lear-Romec catalog.

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RG-9065 PRESSURIZING PUMP—positive displacement, rotary vane, supplies oil-free air to aircraft electronic installations to prevent arcing of hf current. ¼ h.p., 4300 r.p.m., wt. 9.3 lbs. max.

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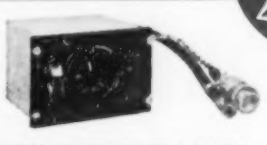

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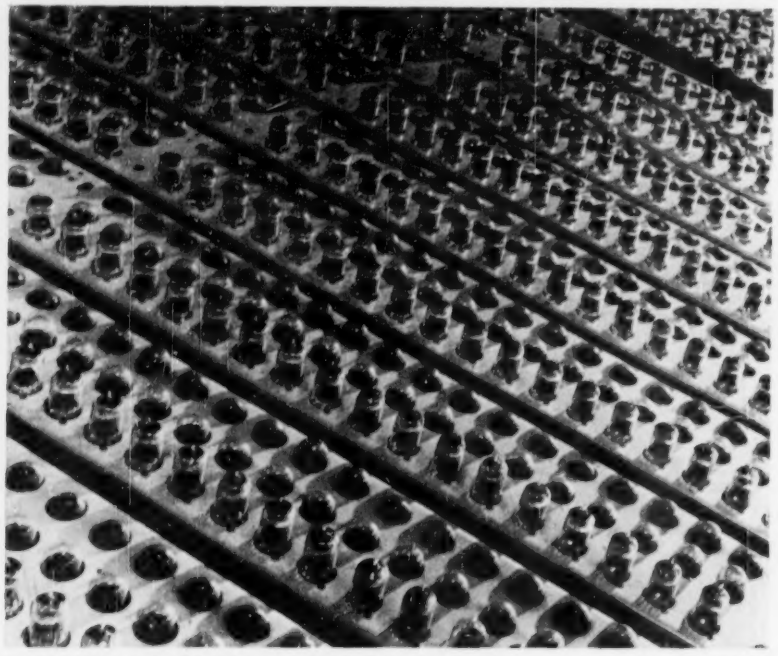

MASS TUBE BURN-IN can weed out incipient tube failures and give improved reliability with existing types, according to Pacific Div. of Bendix Aviation Corp.

Meeting Spotlights Tube Troubles

We know what's wrong, Arinc says, now let's fix it; Bendix-Pacific claims burn-in boosts reliability.

By Philip Klass

Pasadena, Calif.—The current Aeronautical Radio Inc. military vacuum tube surveillance program has pinpointed major tube design deficiencies, an Arinc spokesman told the recent Electronic Components Symposium here, and he challenged the tube industry to start applying this know-how immediately to improve tube reliability.

However, another ECS speaker presented evidence that tube makers have accomplished a large improvement in tube reliability in new premium (ruggedized) types. Tests at the California Institute of Technology jet propulsion lab show that one premium type suffered only 1/20th as many failures as its JAN equivalent under high-intensity short-duration vibration, such as might be encountered in guided missiles.

Another ECS speaker described a method by which Bendix-Pacific has cut rejection rates of sub-miniature tubes by more than 500% and reduced inflight failure rate in guided missile applications to less than 0.2%.

▶ **Emphasizing Reliability**—Unreliability of tubes, transistors, and other circuit components came in for much discussion before 1,500 engineers who attended one or more of the seven technical sessions during the three-day symposium. Many of those who attended came from West Coast aircraft and avionics companies. The symposium was sponsored jointly by the Institute of Radio Engineers, American Institute of Electrical Engineers, Radio-Television Manufacturers Assn. and the West Coast Electronics Manufacturers Assn.

One of the technical sessions was devoted to component problems in guided missiles and required "confidential" military clearance for admission. The opinion of many of those who attended this session, as expressed later to AVIATION WEEK, was that very little if any actual classified information was disclosed.

▶ **Solutions Known**—"Most of the tube deficiencies which cause unreliability and the solutions to these troubles are already known," E. R. Jervis, engineering manager of Arinc's Military Contract Division, told the symposium. "The real problem is one of applying this knowledge . . . (but) this has not been done completely on well known problems."

Jervis made these charges against industry practices:

- "**Cooler tube heaters** have a lower probability of burnout, yet many types are operated at dangerously high temperatures. . . .
- "**Active nickel** in cathode sleeves induces early formation of interface resistance, yet it is still used in many tubes because of the greater ease of processing that kind of nickel. . . .
- "**High cathode temperatures** result in shortened tube life, yet some tube types are made to operate with very high cathode temperature just to satisfy some peculiar circuit application. . . .
- "**One of the main** degradation effects in long-life tubes is the formation of leakage paths between electrodes, and many ways of correcting this have been proved effective—for example, mica slots, shields, magnesia coating, etc.; but not all tubes made for long life incorporate these precautions to the extent required."

▶ **Explaining the Lag**—Jervis attributed the slowness of tube makers to incorporate these fixes to the fact that until recently there had not been sufficient financial incentive (i.e. an adequate market) for expensive super-quality tubes.

He called on tube manufacturers to:

- **Painstakingly examine** every detail of tube construction in the light of findings made in the Arinc military tube surveillance program (AVIATION WEEK May 4, p. 49).
- **Determine best technique** for improving each design shortcoming.
- **Spread improvement** across the board to all similar tube types even before the particular detail becomes a major problem.

Jervis reported some preliminary results of Arinc's tube surveillance program, given earlier by E. F. Jahr of Arinc at the Institute of Radio Engineers' national convention.

Jervis said the types of defective tubes returned to Arinc in the largest quantities during the program included: 6AK5, 6J6, 6SN7, 6AR6 and 12AT7. He cautioned that these tube types are widely used, so the large number of rejects doesn't necessarily indicate these types are the most unreliable. Nevertheless, Arinc's engineering manager said this data "identifies the tube types which should have first attention in a tube improvement program."

▶ **Optimistic Report**—New ruggedized premium tube types appear to be considerably more reliable than their JAN counterparts under conditions of high intensity, short-duration vibration (such as might be encountered in missiles),

Climbs Over 1150 feet per minute . . .

No other plane can match the "performance per dollar" offered by this new Cessna—produced for Flying's Golden Anniversary Year. With full-range flaps—225 H. P. Engine—it fairly leaps from short fields, climbs at over 1150 feet per minute.

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You cruise comfortably at well over 150 m.p.h.—thanks to beautiful streamlining and such features as the new "jet tail" which eliminates trim tabs and reduces drag. Top speed is over 165 m.p.h. Range—over 4½ hours. Four can relax completely in the roomy, quiet cabin.

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said F. A. Paul of the Cal Tech jet propulsion lab. He described tests of 100 each of the premium type 5654 tubes and their JAN equivalent, the 6AK5.

The tubes were subjected to 50G accelerations for six minutes at a fixed frequency of 160 cps. in each of their three mutually perpendicular planes with voltage applied to tube filaments, Paul said. Eighty of the 6AK5 tubes developed one or more faults during the test, but only four of the 5654s failed.

A breakdown of the tube faults:

	6AK5	5654
Broken ground strap	60	1
Near shorts between grids	28	0
Broken mica spacer	13	1
Loose metal particles	7	2
Total Faults	108	4

▶**Weeding Out Unreliables**—Bendix-Pacific Division has devised a technique that has cut to 0.2% the inflight failure rate of sub-miniature tubes used in its telemetering oscillator carried in guided missiles, R. E. Collander of that company said. This low failure rate, representing a 5-8 to 1 reduction from previous experience, is attributed to a three-pronged program of burn-in, inspection, and electrical testing prior to tube use.

Bendix-Pacific originally employed a fourth pre-use test on a vibration table, he said, but experience showed the first three tests caught most incipient failures, eliminating the need for vibration tests.

▶**Controlled Burn-In**—Collander also pointed out that burn-in not only eliminates early failures due to poor heater and/or cathode construction but it can be used to modify tube characteristics. For example, if burn-in is performed with no space current, the tube will gain a high degree of transconductance stability despite changes of heater voltage. However, the transconductance will average somewhat lower than the manufacturer's "bogie value," and there is a possibility of interelectrode leakage, he cautioned.

If burn-in is done with saturation values of space current, the result usually will be a wide scattering of transconductance values between individual tubes, low interelectrode leakage and high emission.

▶**Middle Ground**—Between these two extremes there is an optimum burn-in space current value for the particular circuit in which the tube is to be used. That is the reason tube manufacturers recommend tube burn-in in the actual equipment in which it will be used, Collander said. However, this is seldom feasible for large-scale production equipments, he pointed out. The result is that premium-tube manufacturers usually select a compromise space current value and burn-in time, normally 50 hours.

Bendix has eliminated the need for selecting balanced dual-triode tubes in a push-pull d-c amplifier by burning-in the tubes for 100 hours with a space current equal to 10% of the absolute maximum value, Collander reported. The burn-in also has greatly reduced post-production rejection, he added.

▶**Inspection and Test**—Following the burn-in, Bendix gives the tubes a microscopic inspection in which 75 points of tube construction and condition are checked. The previous burn-in serves to speed up deterioration of improperly fabricated cathodes making it easier to spot this defect under the microscope, according to Collander.

(AVIATION WEEK will cover other ECS highlights in a later issue.)

Thin Film Can Mean Smaller Capacitors

The prospect of smaller, higher-temperature capacitors for missile avionics equipment has been boosted by a new polyester film called Mylar, developed by du Pont. The company says that Mylar has at least twice the tensile and

"THEMI" THEODOLITE NO. 120. "Most satisfactory . . . superior workmanship," says U. S. Army Ordnance expert.
"NITAC" LEVEL NO. 24. World's only level with split-bubble. Erect image.
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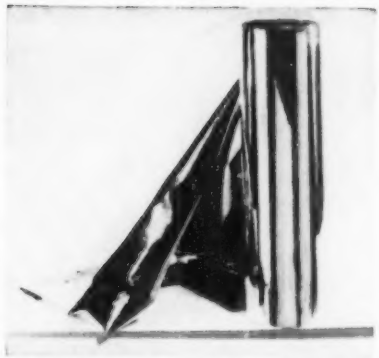
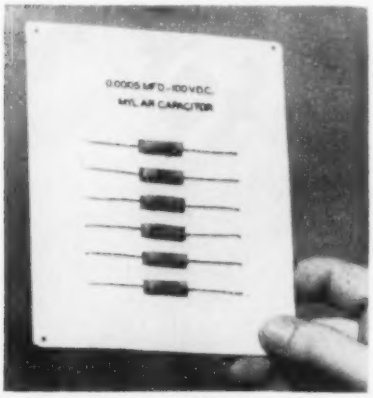


DU PONT MYLAR polyester film, metalized with aluminum, may result in . . .



SMALLER CAPACITORS, capable of operating at higher temperatures.

impact strength of any known commercial film, a characteristic which allows it to be manufactured in sheets only 0.00025 in. thick.

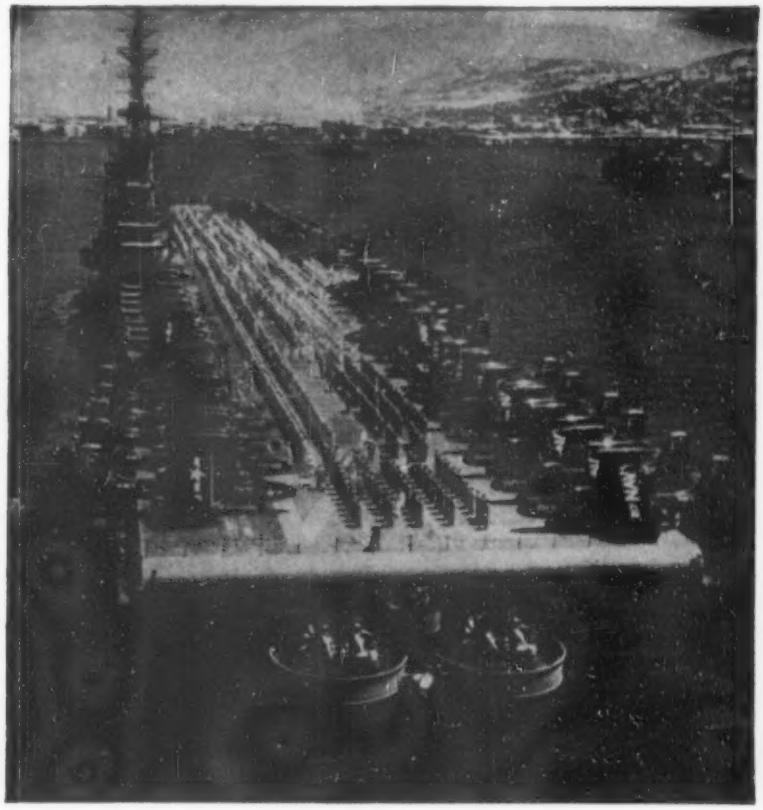
Because of Mylar's high-temperature characteristics, its use in place of paper as a capacitor dielectric should raise the capacitor's allowable operating temperature to 150C or higher, one industry spokesman says.

If the paper dielectric and aluminum foil normally used are replaced with a Mylar film which has been coated with a microscopically thin layer of aluminum, the size of capacitors can be reduced, du Pont says. The company says that a 5-angstrom (one-50 millionth of an inch) thick aluminum coating has been achieved.

Because of its good dimensional stability, du Pont expects Mylar tape to replace the more bulky impregnated glass-cloth tape used for wrapping electrical coils and solenoid. Du Pont also expects Mylar to find use in magnetic recording tape where its thinner gauge will permit more footage per reel.

Du Pont is currently making Mylar on an experimental basis at its Yerkes Research lab in Buffalo, N. Y. A new plant to produce Mylar is to be constructed this year in Circleville, Ohio, and should be in production early in 1955, du Pont says.

McDONNELL F2H BANSHEES—*Outstanding Navy Fighters*



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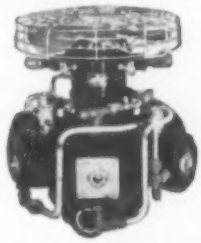

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4CFM . . . 3000 PSI
Powered by integral hydraulic motor. Other models available with various pumping capacities. All compressors can be furnished with either hydraulic motors, DC electric motors or AC 400 cycle motors.

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More defense
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r dollar...

U.S. Air Force delivers it with Lockheed Starfire

Here's a military jet that does an outstanding job—*and saves money in the process*—the F-94C Starfire, a reliable new interceptor for home defense.

Economy is important with the Air Force, and here's how the Starfire helps on the budget.

An economical airplane is one that performs its mission with greatest efficiency and offers maximum availability on the ready line. Maximum time between servicings means *lower maintenance costs*. More important, it means *fewer planes are needed*. The U.S.A.F. provides both types of economy with the Starfire.

Since the Lockheed Starfire is a 2-place interceptor, it utilizes the cooperative efficiency of a 2-man team to compute the tactical problem and perform all the other split-second operations of intercepting an enemy at 600 mph-plus speeds.

No fighter-interceptor can get into the air quicker—none can climb faster—a valuable combination that saves vital minutes in reaching enemy bomber level.

The all-weather Starfire is equipped with automatic electronic controls—Hughes Radar System, Westinghouse Automatic Pilot, Sperry Zero Reader—and other advanced devices, making it very nearly an automatic airplane.

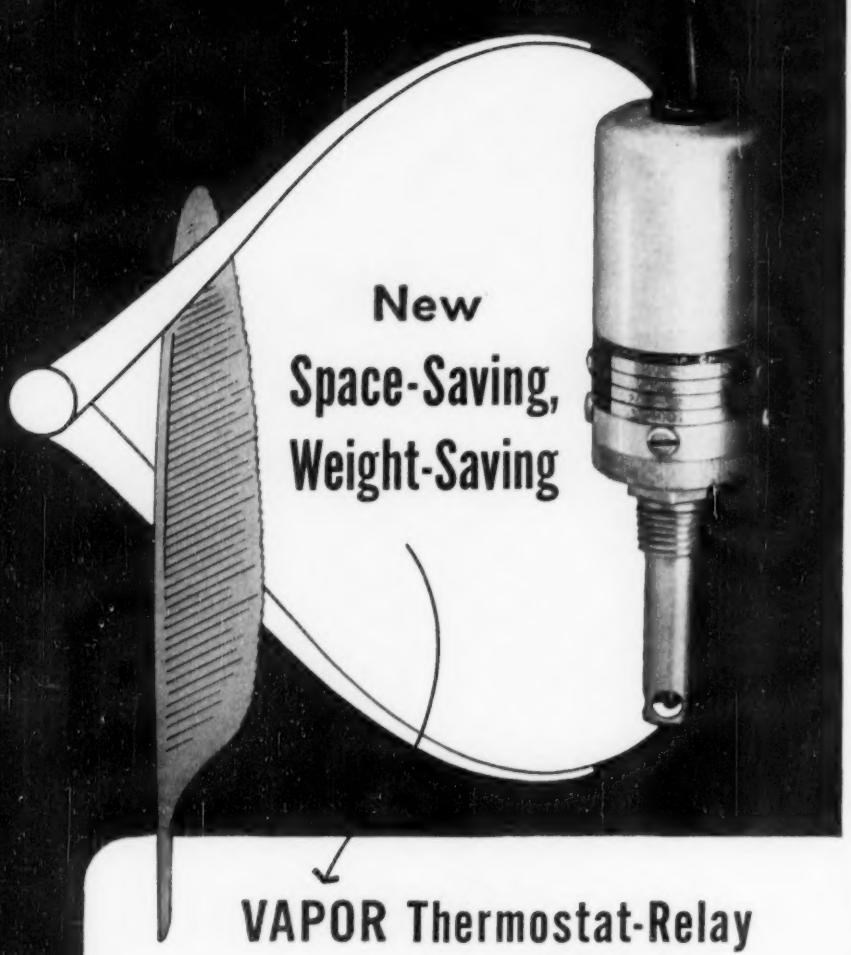
Reports coming in from the field indicate that Lockheed has again produced a "pilot's airplane." Air Force pilots like the Starfire and like to fly it. They find it simple to fly and rock-steady under actual instrument conditions.

Here is the happy combination of 4 important factors in one reliable airplane: (1) Superlative performance—(2) Easy maintenance—(3) Pilot popularity—(4) More defense for your dollar.

Lockheed AIRCRAFT CORPORATION

BURBANK, CALIFORNIA, AND MARIETTA, GEORGIA

LOOK TO LOCKHEED FOR LEADERSHIP



VAPOR Thermostat-Relay Combination

You need no separate control box with this new Vapor Thermostat-Relay Combination. It's a single-bulb, single-contact mercury thermostat with a relay built right in!

Here's new simplicity—new compactness. Carries up to 3 amperes for warning light circuits or motorized shut-off valve operation when used as a limit control.

Fits into ducts...operates on 23-30 volt d.c....meets many temperature control requirements with new space-saving efficiency. Also available for up to 5 amperes in similar design with comparable compactness.

Vapor Temperature Controls—both mercury-tube and electronic—offer definite, worthwhile advantages. Let's get your engineers and ours together, whatever the service problems.

VAPOR **HEATING CORPORATION**
80 EAST JACKSON BLVD., CHICAGO 4, ILLINOIS

FILTER CENTER

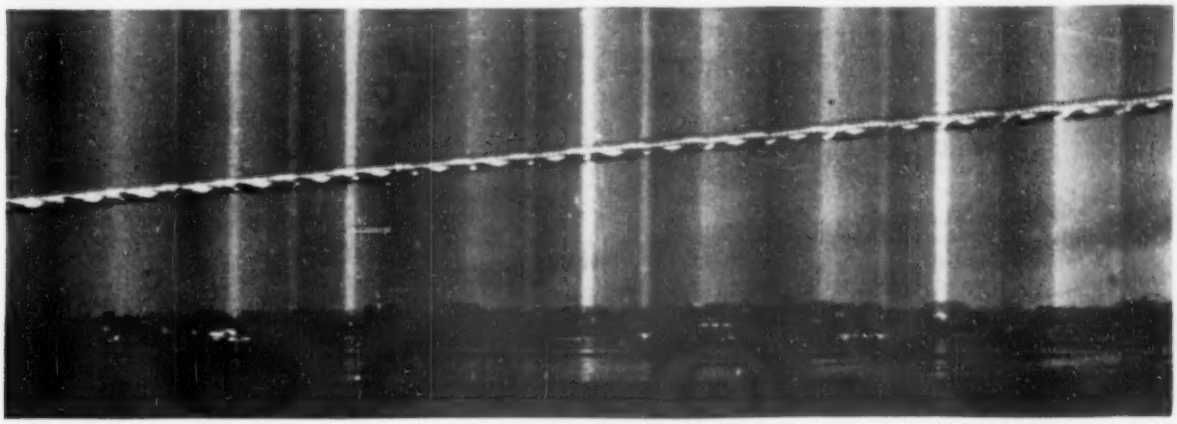
► **Avionics Symposium**—The IRE's professional group on airborne electronics will hold two symposiums on the West Coast in August. One, a classified symposium in Los Angeles on Aug. 18, will be sponsored jointly with the Research and Development Board and the University of California at Los Angeles. The second session will be held at San Francisco in conjunction with the Western Electronic Show and Convention, Aug. 19-21. Prospective authors for the Aug. 18 session should submit 100-word abstracts of proposed papers before June 15 to Research and Development Board, Pentagon Bldg., Washington, D. C., Attn: Mr. Henry Randall.

► **Digital Tach For Engine Tests**—Allison Division of General Motors and Ford Motor Co. have purchased new electronic tachometers enabling them to measure the speed of jet engines under test to an accuracy of one rpm. The new device, made by Berkeley Scientific Corp. of Richmond, Calif., is an adaptation of an electronic counter and reads out engine speed in digital form reducing the chance for human error.

► **MIT Auto-Control Program**—New developments and techniques in the automatic control of aircraft and missiles will be presented in a special summer program, Aug. 24 to Sept. 4, at the Massachusetts Institute of Technology. The program, which will be under the direction of Prof. Robert C. Seamans, Jr., will encompass system analysis and design problems. Further information may be obtained from Director of the Summer Session, Room 3-107, MIT, Cambridge 39, Mass.

► **Military Tube Standardization**—Future avionic equipment must be designed to use only the 192 standardized tube types listed in the new MIL-STD 200, recently approved by the Defense Supply Management Agency. The new spec replaces the Armed Services Preferred List of Electron Tubes, is mandatory for all three services. MIL-STD 200 is expected to ease logistics problems by greatly reducing the more than 5,000 different tube types in military supply systems.

► **Ryder Heads NEC for 1953**—Dr. J. D. Ryder, head of the electrical engineering dept. at the University of Illinois, has been named president of the 1953 National Electronics Conference which will be held Sept. 28-30 at the Hotel Sherman in Chicago. —PK



TAKEOFF OF CONVAIR-LINER at LaGuardia is photographed by Fairchild Flight Analyzer; 58 vertical strips go on single 8½-in. plate.

Camera Setup Helps Study Plane Flight

- **Fairchild sees analyzer as an aid to safety.**
- **Performance of pilot, aircraft can be checked.**

By George L. Christian

First production models of the Fairchild Type IV Photographic Flight Analyzer are now being assembled. Bell Aircraft Corp. is scheduled to get the first two units of the initial run of 10 this month.

Fairchild stresses the contribution the analyzer can make to flight safety. It has already been used to record the effects of extremely high air temperatures, of differences in pilot technique and engine failure at takeoff. It has yielded "more data, more accurately and in more easily interpreted form" than any similar device, the company claims.

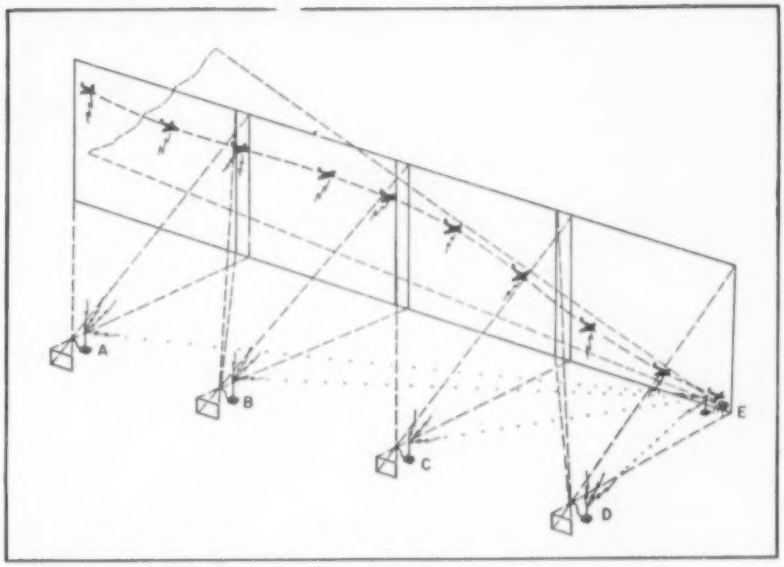


DIAGRAM indicates radio linkage of four analyzers (A-D) and recorder (E).

▶ **Flight Strip**—Developed by Sherman Fairchild and Associates from a prototype instrument reported in AVIATION WEEK Apr. 28, 1952, p. 58, the analyzer consists essentially of a special wide-angle-lens camera and a set of tracking binoculars. The camera remains stationary while the motion of the binoculars moves a focal plane shutter horizontally across the face of the photographic plate, capturing the plane's flight in a series of strips. A Veeder-Root counter showing time in .001-sec. intervals is photographed simultaneously on the same strips.

Since the camera does not move, the plate remains parallel to the line of flight at all times, and the aircraft size remains constant in all strips. If the camera were "panned" in tracking, the picture of the plane would vary, being smallest at the ends of the plate and largest in the center.

A series of Type IV analyzer units can be linked by radio to each other. Each camera has a horizontal range of about four-fifths of a mile; by use of several, a longer flight path can be analyzed. They can also be linked to recording cameras at the ends of the runway and in the plane.

▶ **Something New**—Karl J. Fairbanks, vice president of Sherman Fairchild and Associates, under whose direction the camera was developed, says the Type IV incorporates a number of marked improvements over the prototype. Among its features:

• **Radio linkage system.** The system developed by Fairchild to integrate the operation of several analyzer cameras on the runway, data observer cameras at either end of the runway, and instrument recorder cameras within the aircraft is completely new.

Data recording cameras at the ends of the runway track the on-course, off-course deviation of the aircraft from a perfectly straight line of flight. Instrument recording cameras photograph instruments within the plane, showing aircraft and engine performance, alti-

tude, ambient temperatures, etc.

Fairbanks says the Federal Communications Commission has already assigned two UHF channels for the linkage system.

This is how it works: Square-wave pulse outputs initiated by #1 analyzer camera automatically trigger ground and airborne observer cameras so that all operate in exact synchronization. Radio linkage system also automatically passes control to #2 and succeeding analyzer cameras as required. Dual channel receiver incorporates an electronic gate at the output end which allows only one pulse to pass through to the camera, even though more than one pulse is being received during overlapping range of two adjacent cameras.

• **Lead-in, lead-out.** Original monocular sighting system has been refined to a binocular sighting system which gives the operator 20-deg. lead-in and 20-deg. lead-out. This means that, at maximum range, operator has two-fifths of a mile in which to track the plane and coordinate the camera's movement with the plane's before the camera mechanism automatically begins operation. Camera also stops automatically as instrument begins 20 deg. lead-out.

• **Tilting head.** A special spherical tilting head allows increased vertical range for the instrument. Such a record is a projected record of the flight path, as far as vertical movement is concerned. This may be rectified to true vertical movement when enlarging by tilting the enlarger easel board to the angle the camera was tilted to.

• **Many focal lengths.** Camera flexibility has been gained by making several models, capable of taking lenses with focal lengths from 5½ to 13½ in.

• **Better tracking accuracy.** Slot-moving linkage has been improved by shortening the linkage, thus reducing back-lash to a minimum, increasing instrument's accuracy and simplifying entire mechanism.

• **Leveling head.** Camera can be leveled to within one minute of arc by means of new leveling head. And a 10X gun sighting scope mounted on the unit makes it possible to align the camera to within 1 min. of exact perpendicularity to the runway.

• **Inertia weights.** Long tubular supports carry two large inertia weights to help smooth out panning action when camera follows an aircraft maneuver.

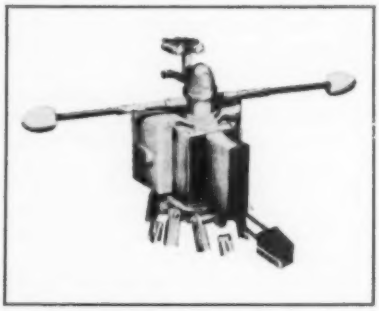
• **Crystal control.** Precise frequency control is assured by using crystal controls in all transmitters and receivers.

• **Power source.** All ground units derive their power from dry cells exclusively, assuring complete portability and independence from power lines. Drain from batteries is so light that they have practically "shelf life," according to Fairbanks.

Other improvements of the type IV include increased durability by substituting forgings and castings for built-up parts; greater corrosion resistance; better, more rigid tripod.

▶ **New Use**—By using two instruments to cover the same portion of a flight path, triangulation calculations can be used to find the course of a flight through space. Fairchild suggests the application of this system to tracking guided missiles.

The Fairchild analyzer camera incorporates a novel electrically triggered shutter-slot combination which travels across the face of an 8¼-in. photographic plate taking 58 individual vertical strips on the plate. The speed of the shutter-slot travel across the plate depends on



Model IV Flight Analyzer.

RANGE EXTENDERS IN QUANTITY

... by PASTUSHIN

Lightweight, jettisonable fuel tanks add combat air miles to America's fighting jets. These super-streamlined aluminum tanks are being produced in great quantities by Pastushin's modern precision methods.

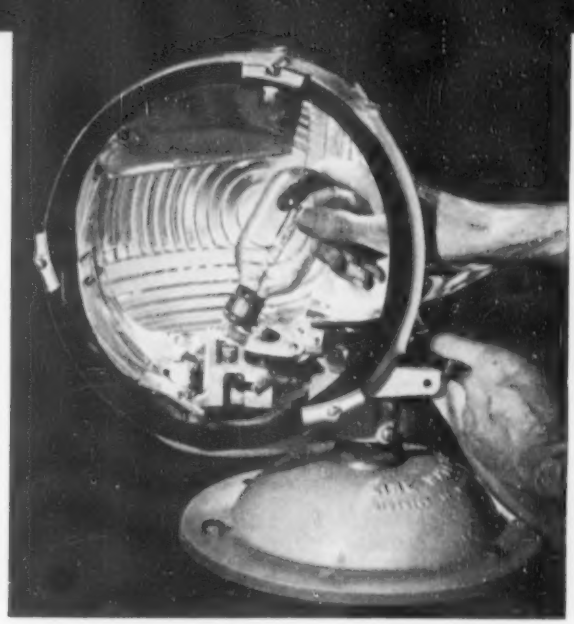
AIRCRAFT FUEL TANKS • SEATS • LANDING FLAPS
AILERONS • TAIL SURFACES • BOMB BAY DOORS

PASTUSHIN AVIATION CORPORATION

5651 West Century Boulevard • Los Angeles 45, California

LOS ANGELES INTERNATIONAL AIRPORT, LOS ANGELES, CALIFORNIA

If the unit should be struck by aircraft the ball-shaped design causes minimum damage. The break-off adapter shears off on impact and the round unit just rolls away. Rugged construction of the unit and the thermal elements insures long life.



Large door swings down, for easy accessibility. Door and lens mountings are completely dust and water tight. Since most of the operating hours are at well below maximum lamp rating, lamps give long life, require replacing only at long intervals.

Here's L-M's New High Intensity Controllable Beam Runway Light

New THERMAL BEAM high intensity runway light has 200,000 beam candlepower. Provides single current control for both brightness and beam direction. Elimination of extra circuits and auxiliaries simplifies operation and reduces installation and maintenance costs.

By **R. E. MADIGAN**
Manager
Airport Lighting Sales
Line Material Company

Many years of development and testing by L-M's lighting engineering staff have resulted in a new and greatly improved high intensity runway light meeting CAA specification L-818.

The new unit, known as the L-M THERMAL BEAM, is ingeniously simple. Its design is based on the principle that weather requiring maximum brightness also requires maximum "coning-in" of the beams.

Single Control for Beam and Brightness

In the THERMAL BEAM, both are controlled by a single current variation. This provides simplified automatic control of beam direction by the tower. Current variations operate directly upon the lamp filament. They also act upon a coiled bi-metal strip which is geared to move the lamp back and forth.

When the current is raised, brightness increases, and the bi-metal strip moves the lamp parallel with the lens and reflector, so that the beam moves inward. Thus pairs of beams from units at opposite sides of the runway meet at a point much closer than in clear weather, when lamp intensity is reduced and beams are "coned" *out* to meet at a farther point.

Temperature-Compensated

A second bi-metal spiral compensates for outside temperatures, so that the beam direction remains constant at any given brightness, regardless of warm or cold weather.

Optical Assembly

The optical elements are specially designed to produce a balanced photometric distribution, meeting all practical operating requirements for landing of aircraft under varying weather conditions.

Reduces Installation Costs

THERMAL BEAM gives lower material and installation costs through the elimination of beam control circuits and auxiliary control equipment. By making use of the current variations employed in regulating lamp brightness, all auxiliary field wiring is eliminated, giving improved reliability.

Write for Bulletin

This bulletin gives more information, details on installation methods, specifications of the units. If you wish, we'll have an L-M Field Engineer call on you. Write to Mr. Madigan at Line Material Company, Airport Lighting Division, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL CO. AW-63
MILWAUKEE 1, WISCONSIN

- ☐ Please send me, without obligation, THERMAL BEAM Bulletin.
- ☐ Please have a Field Engineer call.

*Name*_____

*Company or Airport*_____

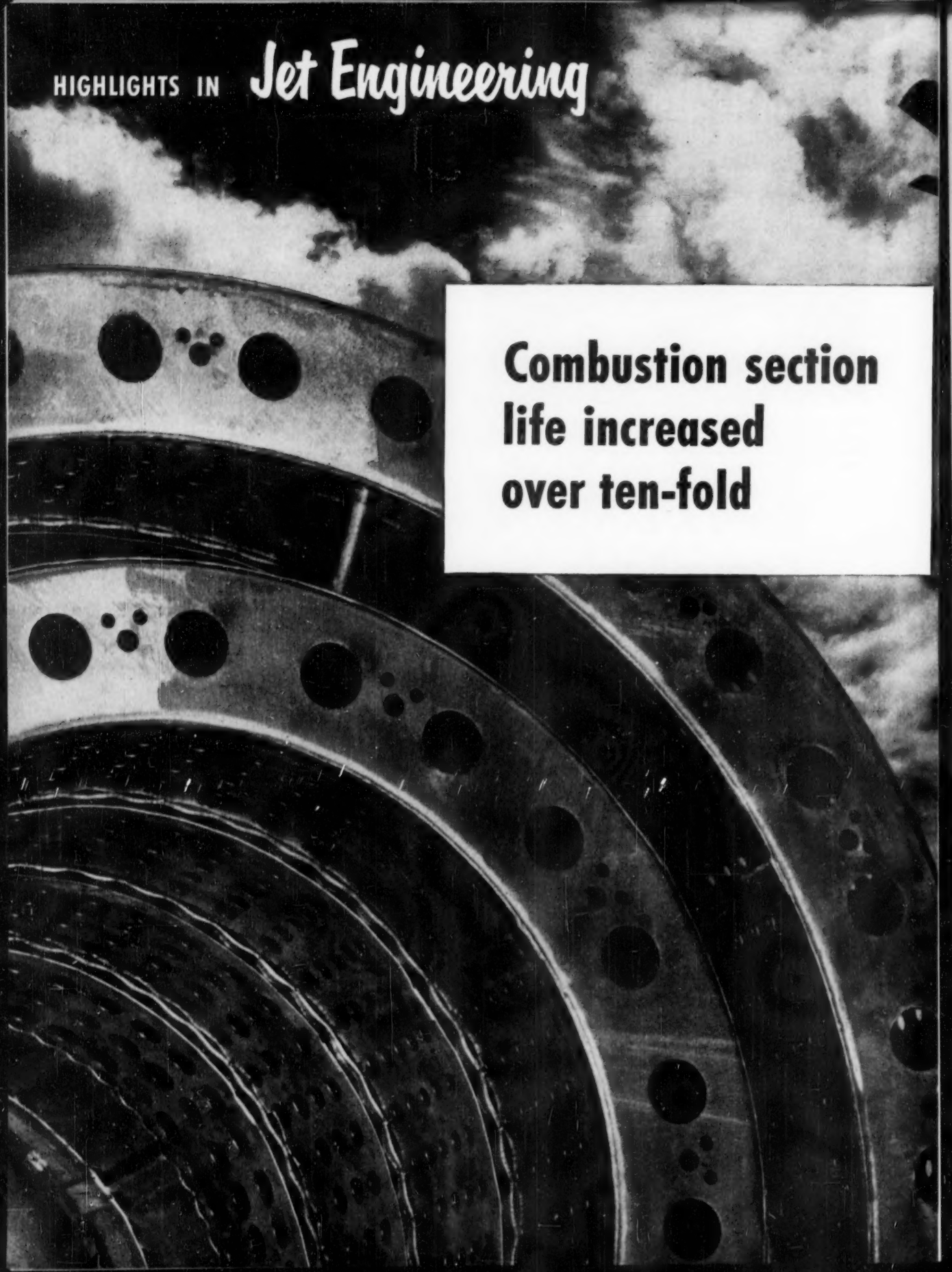
*Address*_____

*City*_____ *State*_____

LINE MATERIAL
Airport Lighting

"THERMAL BEAM" is a Line Material Company trademark

HIGHLIGHTS IN *Jet Engineering*

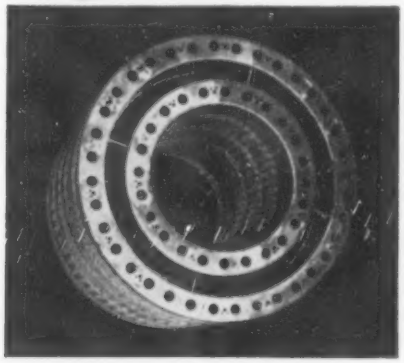


Combustion section life increased over ten-fold

The combustion section of jet engines was given an unprecedented lease on service life with the introduction of the "step wall" liner. The unique design of this combustion chamber liner has proved itself beyond question in the unequaled combat record of the Westinghouse J34 engine. By eliminating severe hot spots and their heavy engine damages, the liner answered one of the most critical of all service-life problems.

The actual design features of the "step wall" liner, a Westinghouse patent, stand out at a glance. In place of the usual cylindrical sheet metal construction, telescopic circular sections have been fitted together. This gives the liner a stepped contour, instead of a flat surface, allowing a continuous blanket of relatively cool air to pass over its surface. The result: protection from the ravages of temperatures over 3000°F.

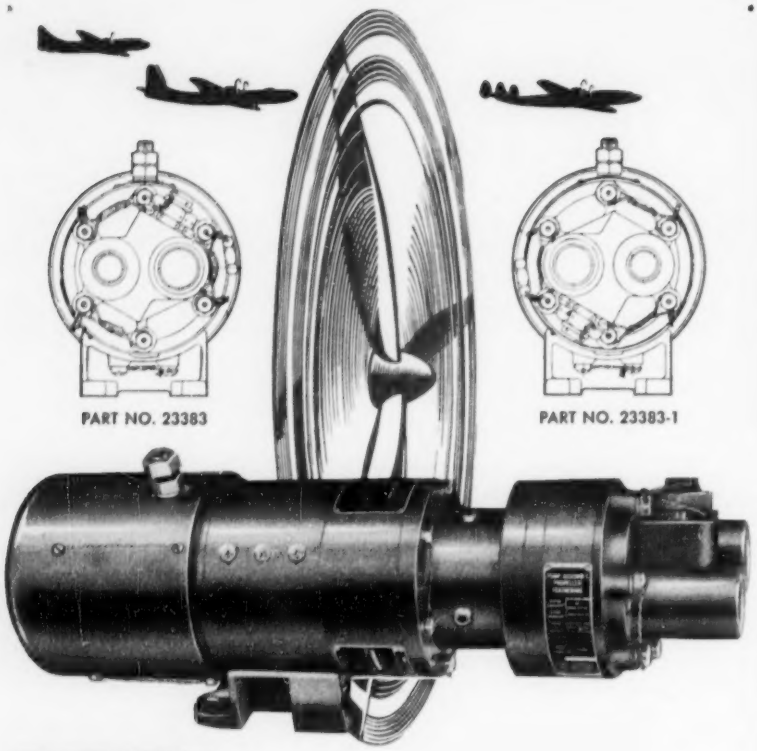
While the J34 was setting its unparalleled combat records in Korea, Westinghouse engineers were designing another new jet engine, using the "step wall" liner—the J40. Already severe altitude and wind-tunnel tests have been made. Again new records have been set . . . over 700 hours without a major component change. And again Westinghouse engineers have new designs on their drawing boards . . . new plans to keep advancing the jet engineering of today, with an eye to faster, more economical air transportation tomorrow. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-54015



"Step Wall" Liner—Full view of combustion chamber liner shows stepped contour design on both inside and outside sections.

YOU CAN BE **SURE**...IF IT'S

Westinghouse



ADEL PROPELLER FEATHERING PUMPS

TROUBLE-FREE PERFORMANCE

"as specified"

RATED CAPACITY: 3.75 G.P.M. min. at 26 Volts D.C. and 170 AMPS. at sea level.
RATED PRESSURE: 825 ± 25 P.S.I.
RELIEF VALVE SETTING: 1400 P.S.I. min. with outlet port blocked.
DUTY CYCLE: 10 seconds on and 10 minutes off.
AMBIENT TEMPERATURE RANGE: −65° to +160°F.
MOTOR ROTATION: Counter clockwise viewed from pump end.
WEIGHT: 20 lbs. 5 ozs.
FLUID: Various aircraft oils and combinations, such as aircraft hydraulic fluid mixed with aircraft engine oil, etc.
Motor designed to meet explosion-proof requirements of Specification MIL-E-5272, Section 4.13.
ADEL Propeller Feathering Pumps meet or surpass all Military or Commercial standards to provide safe, dependable prop feathering performance.

Write for new, descriptive Brochure containing detailed information on ADEL's line of Aircraft Equipment and facilities. Address ADEL DIVISION, GENERAL METALS CORPORATION, 10775 Van Owen St., Burbank, Calif.

ADEL produces a complete line of Aircraft HYDRAULIC & PNEUMATIC CONTROL EQUIPMENT, HEATER, ANTI-ICING & FUEL SYSTEM EQUIPMENT, ENGINE ACCESSORIES AND LINE SUPPORTS.

ADEL LEADER IN AIRCRAFT PUMPS

DIVISION OF GENERAL METALS CORPORATION • BURBANK, CALIF. • HUNTINGTON, W. VA.

CANADIAN REPRESENTATIVE: RAILWAY & POWER ENGINEERING CORPORATION, LIMITED

SHERMAN FAIRCHILD lines up demonstration model of flight analyzer.

the speed of the binocular tracking.

The constant relationship between plate and flight path means that pictures taken with the Fairchild camera can be analyzed for flight data much faster than was possible before, the company says. Direct comparisons between identical aircraft operating under different load conditions are easy to make, for example. "The cameras have almost limitless applications wherever ultra-highspeed motion needs analysis," Sherman Fairchild says.

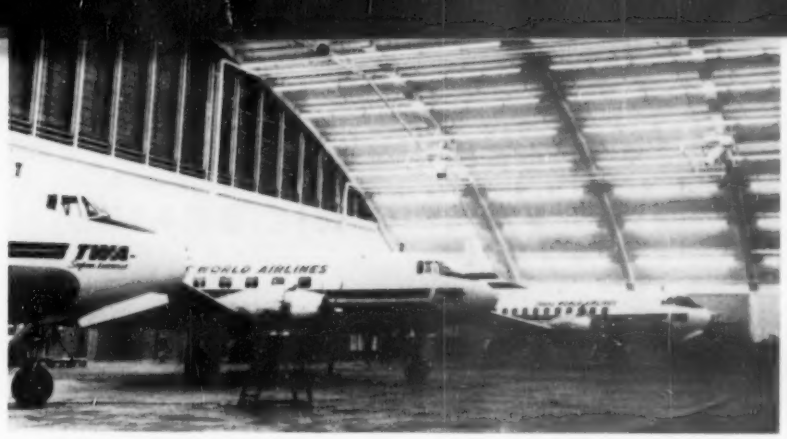
Units weigh about 60 lb. and list at $7,500, including power supply case and two plate holders. Tripod, leveling head and their cases sell for approximately $600 extra.

Address: Sherman Fairchild & Associates, 30 Rockefeller Plaza, New York, N. Y.

OFF THE LINE

Condensifier, featuring a new type of disposable filter cartridge, has been put on the equipment shelf by Hankison Corp. The filter, used to extract water and oil from compressed air used in sprayed painting, is made of wire mesh and flannel and has an area 37% greater than previous models, according to the manufacturer. Model number is A-100-D. Address: 122 Biltmore Bldg., Banksville Road, Pittsburgh, Pa.

More foreign exhibitors have signed up for the forthcoming Aircraft Trade Show in New York. Latest are the French firms, Avions Hurel Dubois and Societe Nationale des Constructions Aeronautiques du Sud-Est. Hawker Siddeley Group, Great Britain, and Ferris, Buarque, S. A., Rio de Janeiro, will also be represented, according to spokesmen for the show. It will be held at the Hotel Statler, New York, June 9-11.



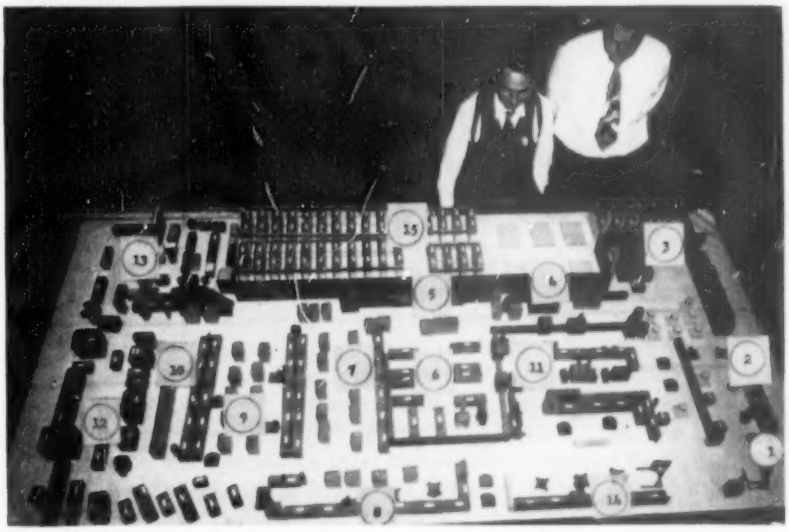
PROTECTING THE FLEET

TWA's new $2.5-million maintenance hangar at Chicago's Midway Airport is guarded by an automatic electric sprinkler system, which in turn is protected by an auxiliary electric system to take over if the main one fails. The hangar can house six twin-engine Martins or four four-engine Constellations at a time—up to $4-million worth of equipment. Blaw-Knox installed the wet-pipe overhead sprinklers; Synchro-Start Products, Inc., Skokie, Ill., designed and built the automatic controls for A. F. Barron Co., Chicago.

What the Airline Operators are Doing

TCA'S NEW FREIGHTER

Trans-Canada Air Lines' purchase of three Bristol 170 Freighters (retouched photo shows one of the planes with TCA markings added) is aimed to help carry the line's booming load of freight. TCA flew 5,643,920 ton-miles in 1952, compared with 3,808,517 ton-miles in 1950 and only 828,824 ton-miles in 1948. Rate went down to 27 cents a ton-mile in 1952 from 36 cents in 1948. TCA's new Freighters are designed to carry 15,845-lb. payload.



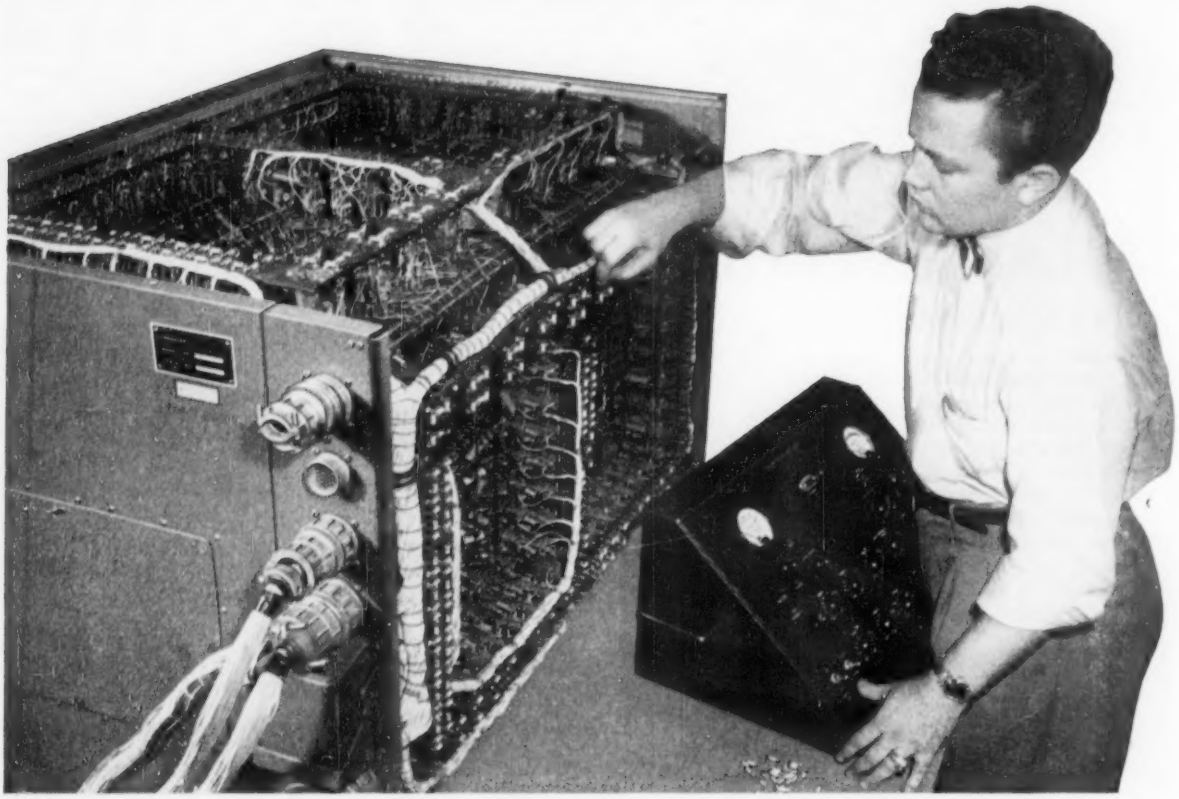
PANAM'S NEW ENGINE SHOP

Engine overhaul shop that Pan American World Airways is building at San Francisco Airport will provide 30,000 sq. ft. for the airline's Pacific Alaska Division. Equipment Supervisor Bob Carpenter (left) and Engine Overhaul Foreman Ed Giles are shown inspecting model of shop. Key to locations: (1) entrance and exit; (2) disassembly; (3) cleaning section; (4) Magnaglo inspection; (5) Zyglo inspection; (6) cylinder, piston and small parts overhaul; (7) crankcase and power section overhaul; (8) crankshaft and master and link rod overhaul; (9) blower section overhaul; (10) nose section overhaul; (11) magneto and harness overhaul; (12) machine shop; (13) plating shop; (14) final assembly; (15) stockrooms.

RAM-OPERATED RAMP

Cargo loading at American Airlines is speeded through use of this hydraulically operated mobile ramp which can be raised as required to the door height of any plane. The ram mechanism is powered by a Hydra-Clutch pump which operates off the loading truck's fan belt, providing 3 gpm. at 1,000 rpm. Pump, produced by National Lift Co., Wayne, Mich., operates only when clutch is engaged to lift.

ENGINEERING BRAINS TEAM WITH ELECTRONIC BRAINS



AT NORTH AMERICAN AVIATION

The combination of North American's imaginative scientists and engineers working with lightning-fast electronic "thinking" machines is an unbeatable one . . . for together they've set advanced standards for guided missile research, development, and design.

Computers like the one being checked above are used to predetermine the flight pattern of a given missile design by simulating its flight conditions, and to solve related problems. North American Aviation engineers also develop and use other electro-mechanical computers which become the brains of automatic guidance systems for missiles and for fire and flight control equipment.

Development of guidance systems for long-range missiles is just one example of the challenging electronic and electro-mechanical work being pioneered in North American's Missile and Control Equipment Operations. If you like theory, you will find an exciting career at North American in specialties such as operations analysis, advanced dynamics, kinematics, noise, error and information theory, systems engineering, statistical quality control, servo analysis, and other advanced fields.

If research, development, or design is your specialty, you'll find attractive opportunities in automatic guidance systems, fire and flight control systems, radar and airborne communications systems and other system developments.

Write today for complete information, giving us your education and experience.

NORTH AMERICAN AVIATION, INC.

Engineering Personnel Section, Missile and Control Equipment Operations

12214 Lakewood Boulevard, Dept. 93-A, Downey, California

NORTH AMERICAN HAS BUILT MORE AIRPLANES THAN ANY OTHER COMPANY IN THE WORLD

NEW AVIATION PRODUCTS

Automatic Light

Line Material Co. has developed a new automatically controlled light to "provide a solution to many of the serious operating problems in high-intensity lighting" on airport runways.

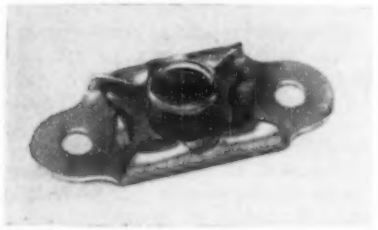
The unit, known as the Thermal Beam, simplifies tower-operator control of the light and eliminates a number of items to give lower installation and maintenance cost.

It is approved under CAA Spec. 1-818.

The unit's design is based on the principle that increased intensity should be accompanied by corresponding increases in coning to provide maximum visibility. Thus brightness and coning controls are combined in a single unit.

The light employs fewer optical elements than previous designs, resulting in maximum optical efficiency, says the company. Combined with a simplified electrical system, this provides improved over-all performance, the company says. Elimination of beam control circuits and auxiliary equipment also results in reduced material and installation costs.

Line Material Co., 700 W. Michigan St., Milwaukee 1, Wis.



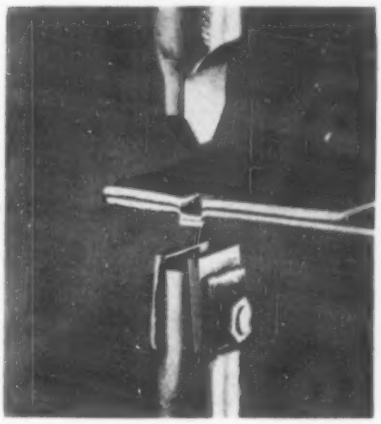
Floating Anchor Nut

A floating anchor nut, interchangeable with fixed anchor types, and claimed by its maker to be the strongest, lightest float nut ever produced, has been announced by the Kaynar Co.

The nut, F-5000 series, is made of tempered spring steel. Kaynar says it is even lighter than fixed types of corresponding size. Alignment is made easier by the nut's ☆-in. radial float feature. The part meets AN-N-5b and AN-N-10a specifications, according to the firm, and is produced in 10-32- and ¼-28 tap sizes. It also complies with drawings AN-362 and AN-366.

Torque-out and push-out values of the new nut are claimed to be the highest ever attained in a self-aligning type. It is self-locking and can be used with temperatures up to 550F.

Kaynar Co., 820 E. 16 St., Los Angeles 21.



Metal 'Buttoner'

Production of punch and dies for Metalacing, a highspeed, low-cost method of "buttoning" metal to metal with no additional element, such as rivets or screws, is underway at Rotex Punch Co., Inc.

The firm is the first licensed to make tools for this fastening process. Sole licensing rights are held by Crockett Engineering Co., San Francisco, under patents granted by the inventor, Ivan A. Williams of Portland, Ore. Punch presses can be converted for Metalacing by replacing usual dies with special ones.

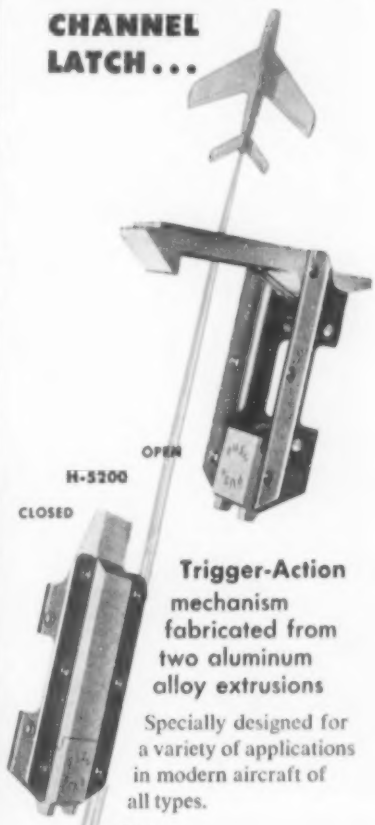
Metalacing can be used with any metal that shears. It provides a fastening with holding qualities comparable to that of riveted assemblies, in Crockett Engineering's opinion. Tools presently produced will fasten metal up to ¼ in. thick.

In Metalacing, three operations take place in a single stroke of the punch:

- Parallel incisions are cut through each of the sheets being fastened, one set of incisions directly below the other.
- Metal bracketed between these in-

New **HARTWELL**
Aerodynamically-Flush

CHANNEL LATCH...



Trigger-Action mechanism fabricated from two aluminum alloy extrusions

Specially designed for a variety of applications in modern aircraft of all types.

- ☆ *Flush*
- ☆ *Rugged*
- ☆ *Positive Action*
- ☆ *Easy to Operate*
- ☆ *Lightweight*
- ☆ *Simple to Install*

Latch trigger and bolt are fabricated from 24 ST aluminum extrusions which provide very small radius of exposed edges not possible with use of punch press parts.

Bracket is made of standard 302 stainless steel sheet stock and actuating springs of music wire cadmium plated for rust resistance.

Installation cut-out is made in the form of a simple rectangular slot and mounting the latch is accomplished by fastening bracket with six rivets to door structure.

HARTWELL
AVIATION SUPPLY COMPANY

Manufacturers of Aircraft Flush Latches and Hinges, Fittings and Cable Terminals.

9035 Venice Boulevard, Los Angeles 34, Calif.
Branch Office: Wichita, Kansas

THE BEST IS NONE TOO GOOD For

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BRAND
CHUCKS

JAWS NICKEL CHROME MOLY ALLOY STEEL . . . expertly heat treated for durability
KEY HOLES— do not extend into body cavity thereby sealing out dirt
STURDY ONE PIECE GEARED NUT CONSTRUCTION . . . prevents slippage
ENTIRE CHUCK BODY HARDENED—Inside and Out
TAPER BORE HARDENED AND GROUND
INDIVIDUALLY TESTED FOR ACCURACY
CHUCKS AND KEYS interchangeable with other makes

SUPREME IS A
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The makers of Supreme brand Chucks are experienced manufacturers of precision mechanical assemblies with an enviable reputation for skill and craftsmanship. This know-how plus the most modern manufacturing equipment gives a chuck that can truthfully be called a quality product. The Supreme Chuck is engineered to give accurate precise performance and stand up under hard steady usage on the job.

You can buy a Supreme brand Chuck with the confidence that you are getting a "top" quality product.

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SUPREME BRAND CHUCKS

Supreme Products, Inc., 2222 South Calumet Avenue, Chicago, Illinois

THE CHUCK THAT LIVES UP TO ITS NAME . . . SUPREME

cisions is pushed downward against the anvil of the special die.

• Cutting jaws on the die move outward so that impact can spread the depressed metal sideways, enabling it to form a lip or fastening "button" under the surface of the bottom sheet.

Rotex Punch Co., San Leandro, Calif.

Shut-Off Valve

A miniaturized motor shut-off valve weighing less than a pound and intended primarily for use in missiles and military aircraft in fuel, hydraulic and pneumatic systems, has been announced by Kohler Aircraft Products Co., Inc.

The component operates with gas and fluid mediums at pressures up to 500 psi. It is compatible with aromatic and non-aromatic fuels, hydrocarbon and synthetic lubricants, and hydraulic fluids ranging in temperature from −65 to 500F. Ambient temperature range is −65 to 225F. The unit employs inert, high-heat-resisting Teflon (du Pont) seals.

Normal duty cycle of this motor-driven shut-off is one second "on," 19 seconds "off." An override also is included to operate the unit manually if required. Kohler's engineers say this is one of the first really suitably small units of its type for military applications.

Kohler Aircraft Products Co., Inc., 814 Vermont Ave., Dayton 4, Ohio.

Panel Slides

Slide rails for rack- or panel-mounted, drawer-type components permit complete removal or tilting of equipment for top or bottom inspection. The rails have been placed on the market by Remler Co., Ltd.

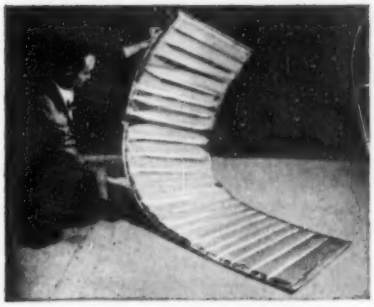
Approved for military applications, the Servislides provide speedy servicing and adjustment of equipment under operating conditions. The slide rails are self-locking and are built in models capable of supporting equipment up to 75 lb. under severe shock and vibration conditions. A pair costs $15.95.

Remler Co., Ltd., 2101 Bryant St., San Francisco 10.

Here's the latest...

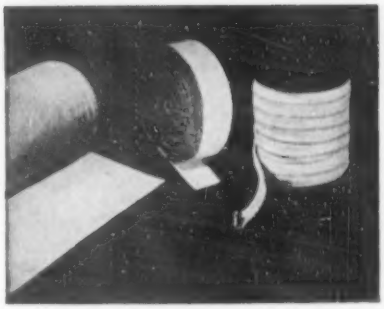
on Johns-Manville products for military and commercial aircraft

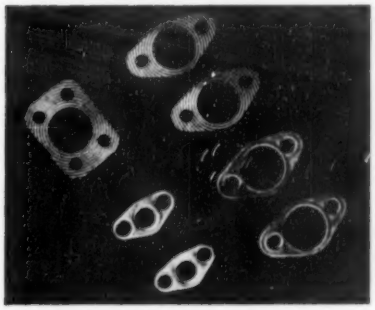
Send for this informative booklet today



It tells about the new Johns-Manville Thermoflex® Blanket with its lightweight RF-300 Felt—the improved blanket type insulation for jet engine exhaust systems and aircraft and powerplant assemblies. ®Reg. U. S. Pat. Off.

It gives you facts about J-M Asbestos Textiles designed for insulating and fireproofing aircraft structures and their component parts, exhaust-system shrouds, and fuel, lubrication and hydraulic lines.





It describes the many special types of Goetze Metallic Gaskets—such as these afterburner igniter gaskets—fabricated by Johns-Manville in almost any size or shape to meet the hot-gas sealing requirements of jet engines.

It illustrates J-M Tadpole Tapes, the special firewall gasketing tapes for sealing combustion chamber inlets, engine mounting rings, turbine flanges and other high-temperature zones in jet-powered aircraft.

For your copy of the new booklet about these and other Johns-Manville Aviation Products, just fill in and mail the coupon today!

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Is high capacity in small space your problem?

here's how makers of outboard motors solve it with **NEEDLE BEARINGS**

Leading manufacturers of outboard motors specify Torrington Needle Bearings because of their high radial load capacity, their compactness and light weight.

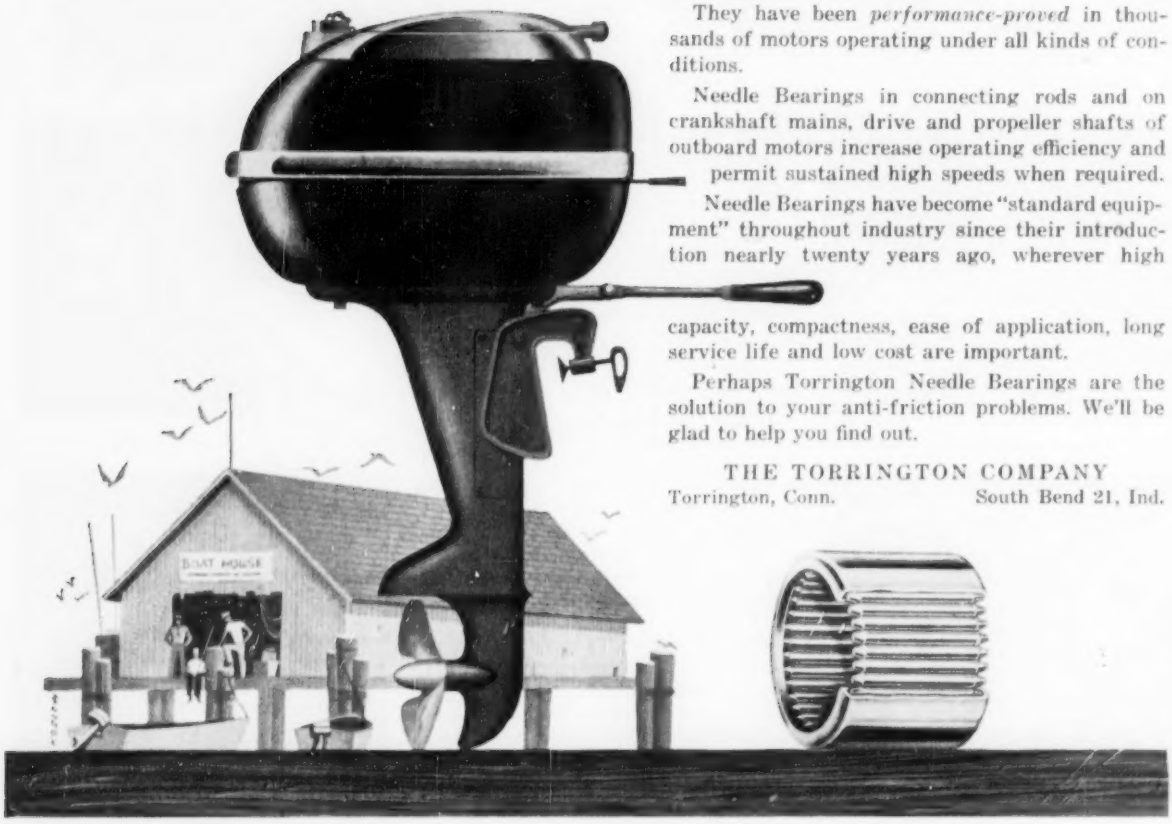
They have been *performance-proved* in thousands of motors operating under all kinds of conditions.

Needle Bearings in connecting rods and on crankshaft mains, drive and propeller shafts of outboard motors increase operating efficiency and permit sustained high speeds when required.

Needle Bearings have become "standard equipment" throughout industry since their introduction nearly twenty years ago, wherever high capacity, compactness, ease of application, long service life and low cost are important.

Perhaps Torrington Needle Bearings are the solution to your anti-friction problems. We'll be glad to help you find out.

THE TORRINGTON COMPANY
Torrington, Conn. South Bend 21, Ind.



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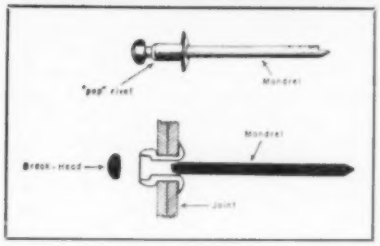

New Blind Rivet for Aircraft Fastening

A blind "pop" rivet developed in England and claimed to cost less than many others of this type now available is being marketed in this country by J. C. Rhodes Co. Inexperienced personnel can drive 1,200 of the rivets an hour, Rhodes says.

The non-explosive rivet reportedly has been used in fastening aircraft structures, among other applications. It is hollow and may be used where pressure sealing, as with plane cabins and fuel tanks, is not required. It is produced in Monel metal as well as aluminum.

The part employs a principle not unknown in this country—a stem at the head of the rivet is pulled to expand the rivet shank on the blind side. As no reciprocating tools which might dent metal are used, the rivet lends itself to driving by inexperienced personnel, and permits fastening of thinner sheets than otherwise would be practical, the company believes.

In this design, the stem or "mandrel" breaks and pulls out entirely, or may leave a plug at the blind side, as desired.

The pop rivets can be fitted with special leakproof caps where pressures do not exceed atmospheric.

J. C. Rhodes and Co., branch of United Shoe Machinery Corp., New Bedford, Mass., makes the rivet in the U. S. It was developed by Geo. Tucker Eyelet Co., Ltd., in Britain.

How Alternator *BURN-OUTS* can be *Eliminated* with New Alarm System

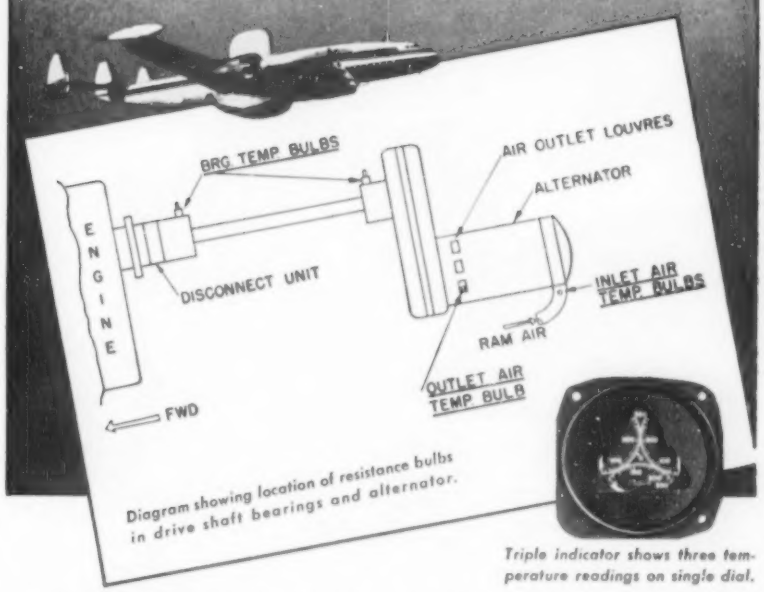

Diagram showing location of resistance bulbs in drive shaft bearings and alternator.

Triple indicator shows three temperature readings on single dial.

Lockheed and Edison engineers jointly developed this new Temperature Alarm System to eliminate burn-outs and bearing failures in the high speed alternator drive system of the RC-121C and WV-2 aircraft. After alarm the entire alternator drive system can be immediately disconnected.

This new Alarm System utilizes the same type of EDISON components which already have given years of dependable service in aircraft throughout the world. Standard tip-sensitive electrical resistance bulbs are placed in the drive shaft and gear box bearings to detect an early temperature rise which might lead to a bearing failure. The sensitive part of the bulb penetrates the housing and actually bears directly against the bearing race so that the slightest temperature increase is felt immediately and indicated on the left and right-hand scales respectively of the triple panel indicator.

Because of critical space limitations in the alternator itself it was decided to measure the differential temperature across the inlet and outlet air passages. Two bulbs in the inlet air duct are compared to a single bulb in the outlet air louvres and the differential temperature is indicated on the bottom scale of the panel indicator. The primary purpose of this arrangement is to detect a temperature rise due to mechanical failure with the added advantage of detecting electrical overloads. This added safety feature presents the possibility of preventing complete shut-down by reducing the alternator load.

An integral automatic alarm circuit completes the system so that the crew is alerted by visual warning well in advance of any danger from critical temperatures.

Thomas A Edison
INCORPORATED
Instrument Division
Dept. 49, West Orange, New Jersey

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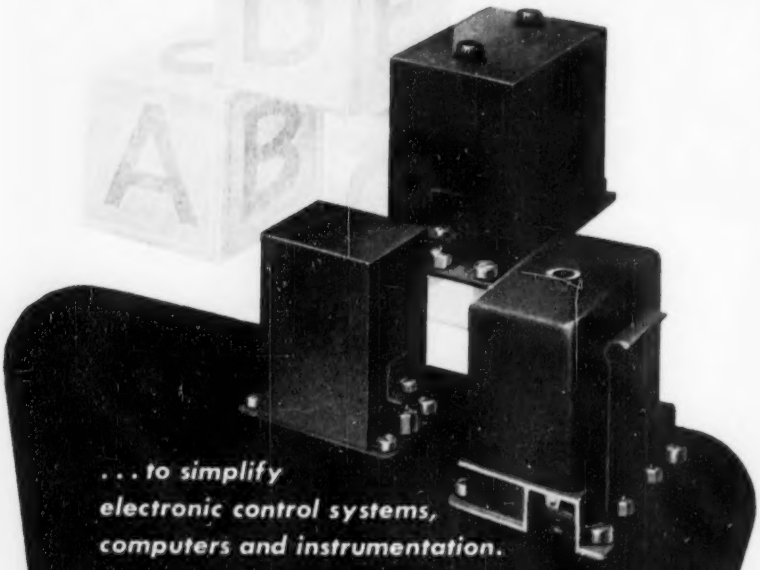
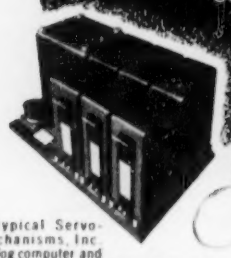
Electronic BUILDING BLOCKS



. . . to simplify electronic control systems, computers and instrumentation.

Servomechanisms, Inc. "building block" or packaged function technique reduces intricate "all in one" systems into simple, standard electronic components which plug into pre-wired chassis. This advanced design philosophy provides ***reliability, interchangeability, and ease of maintenance.***

The same concept has been applied to Servomechanisms, Inc. expanding line of transducers.



Universally accepted and proven in combat these "building blocks" are available for 60 and 400 cycle applications. Write to Dept. CLO-4 for complete information.

A typical Servomechanisms, Inc. analog computer and transducer for aircraft instrumentation

SERVOmechaNISMS INC.

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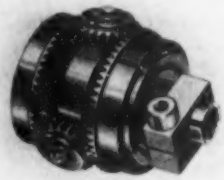
POSITIONING MECHANISMS • SERVO AMPLIFIERS • MODULATORS • POWER SUPPLIES
SERVO MOTORS • ADAPTERS • TRANSDUCERS • MECHANICAL DEVELOPMENT APPARATUS

ALSO ON THE MARKET

Improved spiral backup ring gives better protection to O rings by incorporating new system of measurement which takes into consideration actual piston groove diameter, rather than nominal inner diameter of O ring. Design reduces so-called "Z gap," minimizing possibility of distortion by misalignment. Also, spiral ends are scarfed to 30, rather than 90 deg., so that an almost flat surface is presented to O ring under pressure.—Reid Enterprises, 2363 E. 38 St., Los Angeles, Calif.

Selenium regulators embracing a basic design in which flexibility is the keynote have been developed for regulation of relatively low d.c. voltages, in the order of 1.5 to 3 v. Design consists of two or more specially processed selenium plates connected in series on a mounting bracket. Regulators for higher voltages are provided simply by adding plates.—International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif.

Hollow-shaft differential for computers weighs only 1¼ oz., and is designed for high accuracy in adding and subtracting operations. It is expected to have primary application in angular or angular



velocity sums and differences and sequence operations.—Librascope, Inc., 1607 Flower St., Glendale, Calif.

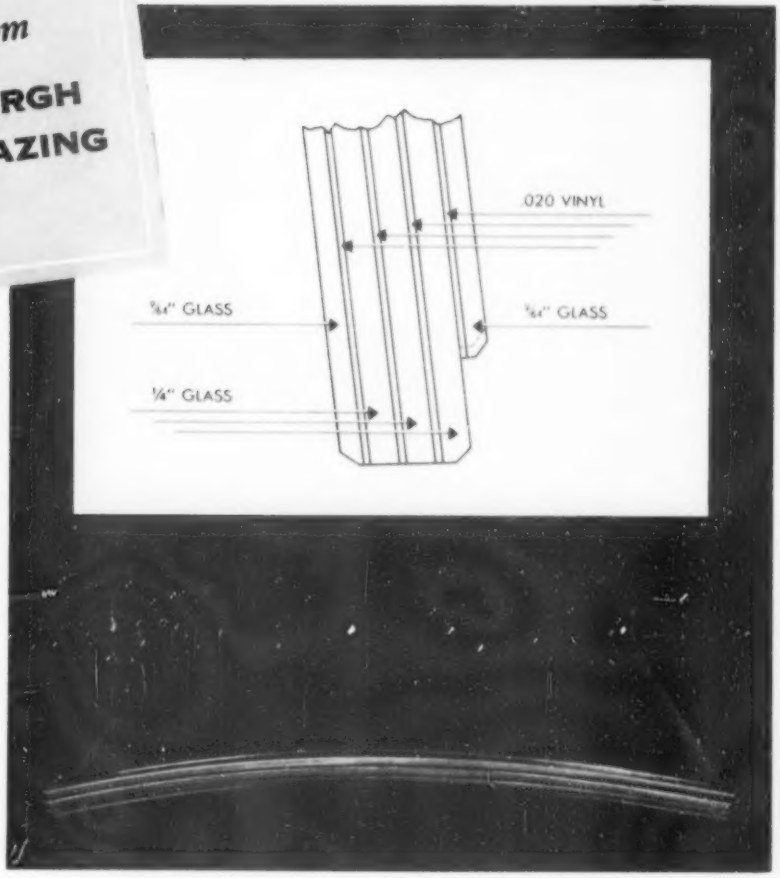
Pre-formed solder, made up in a wide variety of shapes and sizes, disks, rings, pellets, etc., as needed to fit specific jobs, speeds production and cuts waste. Conventional methods of heating and applying solder can be used with these die-cut Solderforms. They are being used in manufacture of germanium diodes and other parts, reports the maker. —Kester Solder Co., 4201 Wrightwood Ave., Chicago 39.

Stainless steel can be cut fast and efficiently with Model 800 horizontal bandsaw which utilizes Milford Rezistor improved highspeed bandsaw blade. Saw is reported to have set new records for cutting efficiency and cuts per blade in stock up to 8 in. in diameter.—Wells Mfg. Corp., 160 Service Rd., Three Rivers, Mich.

How big areas of curved Multiplate are used in the windshields of the Douglas AD-5

A report from

THE PITTSBURGH AIRCRAFT GLAZING FILE



DESIGN of the Douglas AD-5 "Skyraider," called for a divided windshield of curved bullet-resisting glass more than one inch thick. The accompanying diagram and photograph show how Pittsburgh Multiplate Glass was engineered to this job.

The Multiplate used in this windshield consists of five plies of glass with vinyl fillers between. In the cross section above, the inside and outside plies are 9/64" and the three interior plies of glass are ¼". Vinyl fillers are .020", giving an over-all thickness at this point of 1 1/32" +⅛"−0".

Each windshield contains 628.31 square inches of Multiplate. The glass is curved to a 45" radius and has a "depth of bend" of 1¼".

Pittsburgh Plate Glass Company offers you a combination of a wide range of special purpose glasses and unmatched experience in their application to specific aircraft glazing problems. It will pay you to take advantage of this combination in your next design problem.

If you would like the assistance of Pittsburgh technical representatives, write to Pittsburgh Plate Glass Company, Room 3273, 632 Fort Duquesne Blvd., Pittsburgh 22, Pa.

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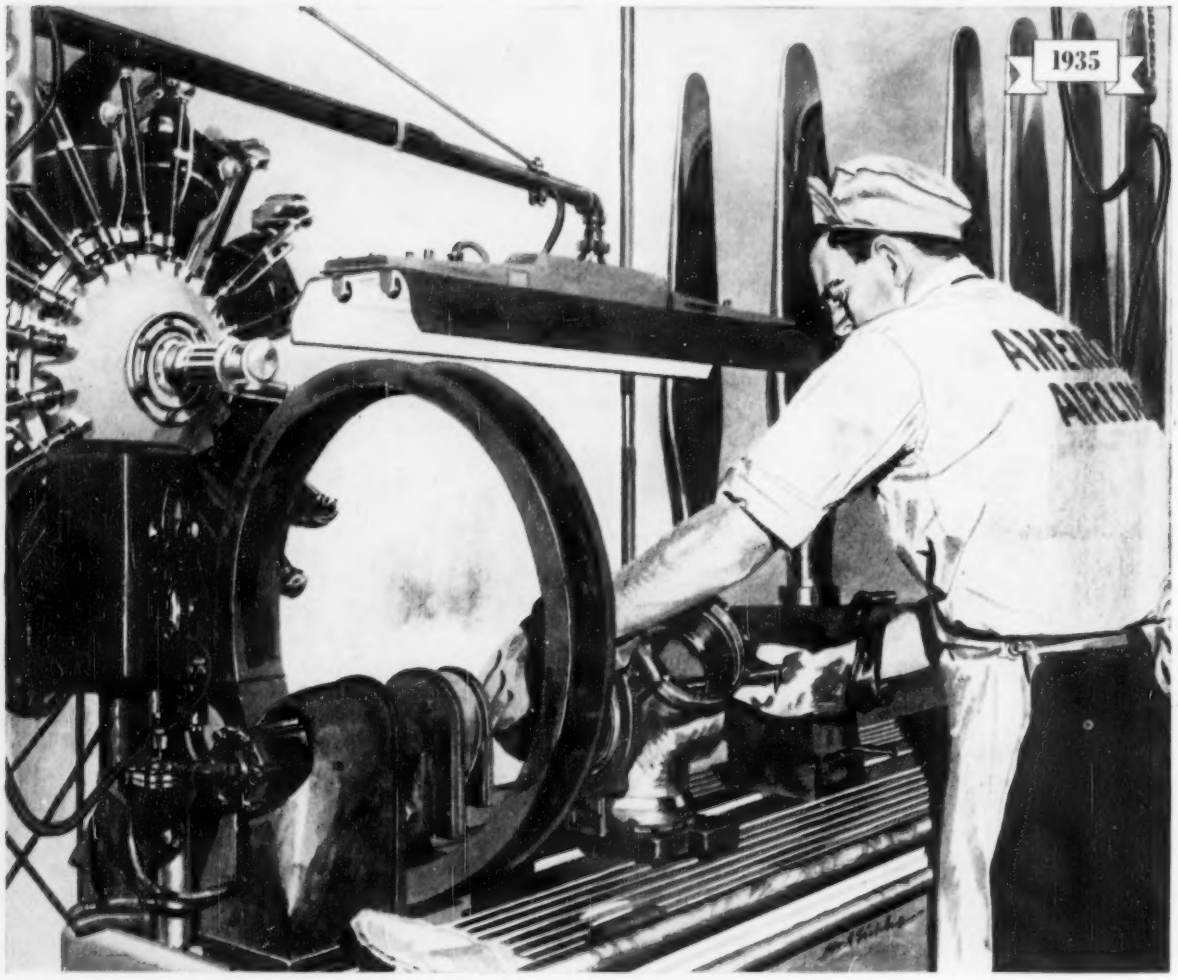

Pioneering in Magnaflux–the Metallic "Detective"

Magnaflux is an electrical process used to detect hidden imperfections in magnetic material. It is used by American Airlines in the inspection of propeller parts, crankshafts, valves, springs, and other parts made of steel.

Magnaflux is so accurate that it shows up cracks 1/20,000,000 of an inch deep, reveals flaws that cannot be seen by the naked eye.

In 1935, American Airlines purchased this equipment from the Magnaflux Corporation and became a pioneer in applying these principles of preventive maintenance in air transportation. Only a few years later the Civil Aeronautics Administration ordered all airlines to use this method of scientific inspection.

Magnaflux detection devices are only one of a long series of milestones in the history of air transportation that have been introduced first by American Airlines.

AMERICAN AIRLINES INC.

America's Leading Airline

LETTERS

Lightplane Defenders

With so many of your readers jumping on Capt. Robson for his recent column about the training received by the average Air Force pilot who is required to do airline-type flying, I do not think we should overlook the airline co-pilot who jumped on Max Karant (of the Aircraft Owners and Pilots Assn.) for pointing out that most mid-air collisions between airliners and personal aircraft have come about through the airliner running into the personal aircraft.

I have been an airline captain, a military pilot, and I also fly a personal aircraft whose gross weight is 1,750 lb. To my airline training must go credit for practically all the safe and precise flying habits I have developed in the last 23 years. To my airline experience must also go credit for at least one bad habit I have developed—not looking out the window enough!

The airline co-pilot, who wrote the critical letter in answer to Max Karant's letter, himself gave one of the reasons why airline pilots develop this bad habit. (It took him two good-sized paragraphs to list the items in a pre-landing cockpit check.) He failed to mention, however, that there are two pilots, and quite often an engineer, to accomplish these checks.

This matter of pre-landing cockpit checks however is not, I feel, the real reason if we look at the record. With the exception of one recent airliner-personal aircraft collision at Dallas, I cannot remember any such collision since the beginning of World War II that occurred at a time a cockpit check should have been going on.

Practically all of the airliner-personal aircraft collisions have occurred at a considerable distance from any tower-controlled airline terminal. They have occurred when the airliner was in straight flight, and at a time when the personal aircraft was being overtaken by the airliner.

The real reason the airline pilots don't look out the cockpit more is—they just don't have to. They have everything right there on the instrument panel to get them within 500 feet of where they're going to land. They use these gadgets during instrument weather and during night flying, and they continue this practice during VFR flying too. . . .

No, I'm afraid I agree with Max Karant. The airline boys could look out a lot more than they do.

Charles L. Smith
110 Hanshaw Road
Ithaca, N. Y.

Pilot Seat Visibility

The CAB accident report on a DC-6-lightplane collision proves that the pilot should fly this aircraft from a passenger seat. The report states that two passengers were able to see the Swift before the collision, and that both actually saw it apparently in sufficient time to avoid it, if they had been flying the DC-6. In the analysis of this accident the statement is made: "Investigation indicated that the Swift would not have been visible to the crew of Flight 910 until only a second or two before collision."

It seems to me this proves something in regard to recent discussions of cockpit visibility or lack of it. Maybe an intercom could be arranged so the passengers could tell the pilot where he is going.

As a Swift pilot myself, I intend to keep a good lookout to the rear and above for DC-6s, as it is apparent they cannot see me unless I am within a few degrees of their altitude and near enough to their heading to keep from being hidden by a wing.

Wayne H. Mikel
21 Holly Drive
Warwick, Va.

Why Tail Skids?

For normal flights the DC-4 and DC-6 tail skids are not necessary, so why carry the extra weight? It should be easy to install the skids for training flights and take them off for scheduled flights. With scheduled flights, it should be very rare that a no-flap landing would be made. Since such occasions would be rare, it should prove cheaper to fix the minor fuselage damage than to lose the 35 lb. of payload every flight.

The little item about the belly-mounted camera installation for American Airlines in the Mar. 23 Aviation Week further illustrates my theory. That picture clearly shows there is a very large margin of safety for the tail skids.

My past experience as spare part coordinator for the Scandinavian Airlines belies the conclusion that since airlines buy spare tail skids, the skids are used during landings. The airlines do buy spare skids, but only as a normal provisioning procedure and not because of attrition in service. During a year and a half with the Scandinavian Airlines System not a single tail skid was replaced.

S. Norman Rosengren
300 Belview Ave.
Hagerstown, Md.

Accident Reports

Over the course of the past several months, I have noticed that readers of Aviation Week have complimented you upon carrying official CAB accident investigation reports.

May I add my own appreciation for the importance you place on such reports and the service you provide your readers by publishing them. These reports, which are considered required safety reading by the pilots of many air carriers, may be obtained regularly by the public if they ask to be placed on the mailing list for such reports as issued by the CAB Publications Section, Washington 25, D. C.

I think it is very important also to point out here that Oswald Ryan, Chairman of the Civil Aeronautics Board, testified recently before the House Committee on In-

PROBLEM: To perform vibration tests to MIL-E-5272 and other specifications.

SOLUTION: The MB Model C-25 Vibration Exciter *rated at 2500 pounds force.*

Shake testing gives a quick method of developing a product to withstand vibration. Such testing is vital in aviation. To meet the need, MB has applied its specialized vibration engineering to develop a range of shakers in various ratings for testing everything from electron tubes to airframes.

The big C-25 model develops large "brute forces" to meet vibration requirements of specification MIL-E-5272. It has heavy duty capacity for a wide range of work, including fatigue testing, shake testing of all types of electronic, electrical and mechanical components.

One of the largest and most dependable electromagnetic shakers available, the C-25 model is a good example of vibration engineering that has made MB "headquarters" for products to *isolate, control, reproduce, detect,* or *measure* vibration. More information on shakers in Bulletin No. 1-VE. Write us.

The widely used Pedestal MB Mounts, too, are produced by . . .

THE MB MANUFACTURING COMPANY, Inc.
1067 State Street, New Haven 11, Conn.

terstate and Foreign Commerce in connection with the Board's air carrier accident investigation work, as follows:

"There is no mystery as to the cause of practically all air carrier accidents in the history of the Board. Indeed, I am pleased to report to the Congress that since 1938, we have investigated 722 air carrier crashes, both fatal and nonfatal, and only 26 of these accident cases remain unsolved, or 3.5%. In each of these 26 unsolved cases it is important to understand that the evidence was either completely obliterated by fire and impact or the major portion of the wreckage itself was missing.

"On the basis of these investigations, actions are taken by the parties primarily concerned with the causes of the accidents. Design modifications are accomplished if needed, new training of personnel is accomplished, or new rules and regulations promulgated to eliminate the future accidents of this kind."

EDWARD E. SLATTERY, JR., Chief
Office of Public Information
Civil Aeronautics Board
Washington 25, D. C.

Engineer Shortage

Recent articles concerning the engineering manpower shortage (e.g. "A Plan for Stretching Engineer Supply" in the issue of Dec. 1, 1952) contain some commendable ideas; however, the view most commonly held by working level engineers has not been publicized.

Certainly we are all concerned over the significance of the situation, as we realize that the material strength of America, nationally and internationally, lies largely in the extent of its industrial development. Since engineers have a very important role in this development, an actual shortage of engineers would seriously affect our country.

We must not forget that as recently as 1950 there was a significant surplus of engineering graduates. Then, shortly after the Korean war started, engineer shortage was heralded with fast mounting numerical estimates (usually obtained from industrial management sources). We must conclude either that the demand for engineers is a function of the magnitude of the defense effort, or that industrial management displayed a complete lack of foresight by not expanding engineering activity in 1950 when engineers were available in anticipation of present and future needs.

The most popular long-range approach to the shortage appears to be an effort to glamorize the engineering profession to qualified high school students by picturing typical engineering developments such as jet airplanes, bridges, advanced automobiles, etc., and asking them if they wouldn't like to take part in future developments.

Actually, the true situation is that modern developments are so complicated that any single individual's efforts are devoted to an insignificant-appearing component of the whole. Very often there is no attempt on the part of management or supervision to give the individual an overall picture of what is being accomplished.

A typical example of the utilization of engineers is that of an engineer who had graduate engineering study, and had experience in rocket analysis, who was put in a project group responsible for the installation design of the rocket assist takeoff unit in a large military aircraft.

His job there consisted of designing the hinge on the access door for the rocket unit. He might be considered fortunate compared to the engineering graduates whose jobs are detailing the location of the thousands of rivets or miles of electrical wiring which are a part of modern aircraft. Is the fact that graduate engineers are not available for this type of work, at wages most skilled labor wouldn't consider, the basis for the present engineer shortage publicity? Actually industrial management is simply faced by a situation in which they must efficiently utilize engineering talent, and their reaction seems to be a scream that a disastrous engineering shortage exists.

The solution to the engineering shortage lies not in the formation of more management-dominated commissions and committees to investigate the problem, nor in brochures which give an unrealistic picture of the engineering profession to high school students, but in action on the part of industrial management and engineering supervision to delegate engineering responsibility to competent engineers, and to use intelligent high school graduates for sub-professional work. This should be accompanied with continually expanding industry for the benefit of the nation and the world as a whole, in which case engineering positions will exist for future engineering students.

D. G.

Aircraft Parts by Eaton

combine outstanding developments in design, metallurgy, and production engineering

Since the early days of World War I, Eaton has made many important contributions to civilian and military aircraft engines in design, metallurgy, and production. Eaton's understanding of the problems peculiar to the aircraft industry has led to the development of unique, high-volume production facilities for the manufacture of parts which meet exacting aircraft standards of quality.

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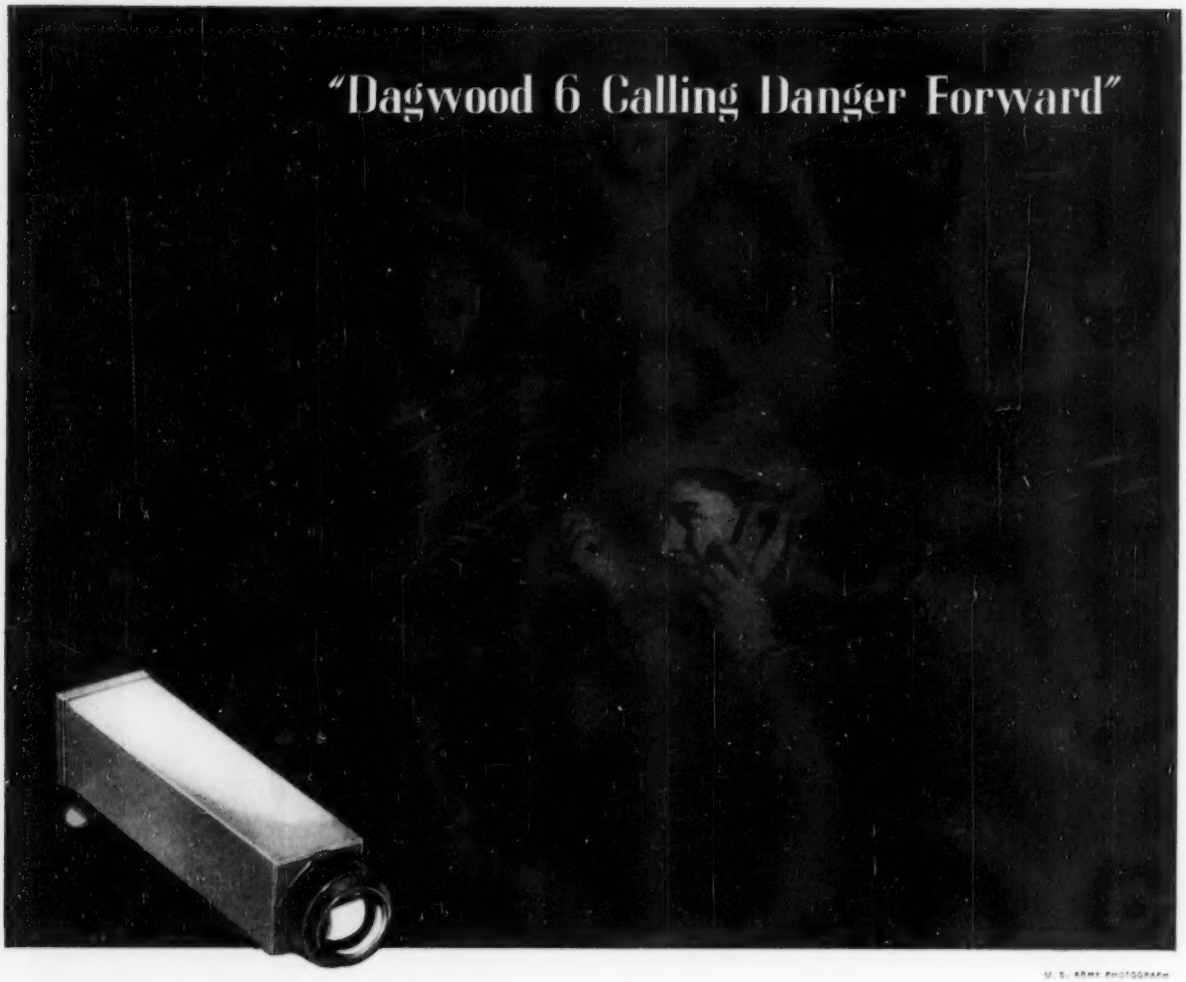
PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

"Dagwood 6 Calling Danger Forward"



U. S. ARMY PHOTOGRAPH

G.I. Joe now puts his calls through a new field switchboard twice the capacity and one-third the size of the one toted by his World War II counterpart.

The new "board" has a constitution that can winter in Rejkjavik, summer in Mombasa, and roll with a punch . . . just in case travel gets rough. Its retractable cords know when to come in out of the rain and goo.

Among the many essential parts of this instrument there is one named simply "SIGNAL. switchboard." It is a luminous-painted signal, operated by an electro-magnet, which "drops" into view when a line is calling. There's one "drop" for each telephone cord circuit; each drop is enclosed in a square housing made from Superior Hard Drawn Carbon Steel AISI C1008—.6815" I.D. Square, .020" wall, 2.656" long. Tolerances are close—±.005" on the length and +.007",—.000" on width.

Mr. Lloyd Bender, Vice President of The North Electric Manufacturing Company, makers of the switchboard, says of Superior, "Your performance has been excellent—in workmanship, quality of material and delivery."

Are you looking for a good small-tubing source—one that gives you the widest choice of tubing analyses available in America today, one that can supply you with one or one-million feet, one known for its uniformly high quality, and its interest in you and your tube problems? Try Superior. Superior Tube Company, 2040 Germantown Ave., Norristown, Pa.

Round and Shaped Tubing available in Carbon, Alloy, and Stainless Steels, Nickel Alloys, Beryllium Copper, and Titanium

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All analyses .010" to ⅝" O.D.
Certain analyses in Light Walls up to 2⅛" O.D.

WHAT'S NEW

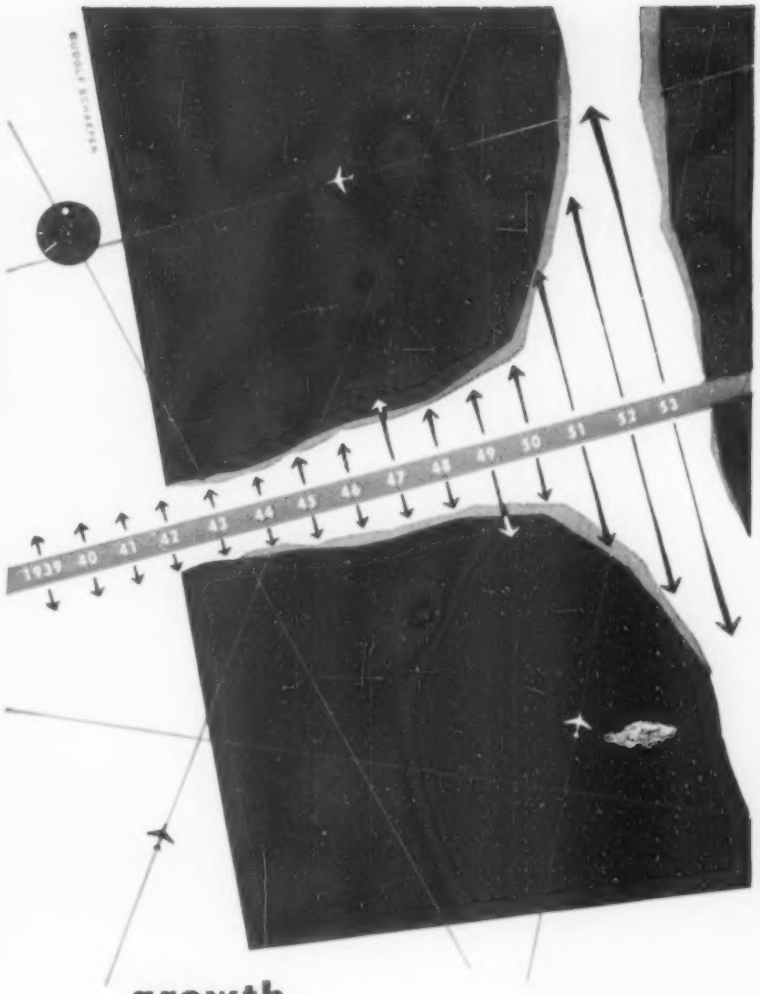
Telling the Market

Roller gear drive, a new type of indexing mechanism designed to replace Geneva drives and other types of indexing devices, is detailed in Bulletins 101, 102 and 103 available from Ferguson Machine & Tool Co., P.O. Box 191, St. Louis, Mo. . . . **Notching units** for work on mild steel to ⅛-in. and ¼-in. thicknesses are described and specifications given in Catalog N, 4th edition, being distributed by Wales-Strippit Corp., North Tonanwanda, N. Y.

Precision surface form grinder capable of handling flat, grooved or curved surfaces on the roots of jet engine compressor blades and turbine buckets in an automatic cycle is illustrated and described in Bulletin 50226 issued by Ex-Cel-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. . . . **Shell molding process** for producing stainless alloy castings is described in booklet being distributed by Solar Aircraft Co., San Diego, Calif. Also covered is the firm's capability for turning out castings ranging from one ounce to 350 lb. in difficult-to-handle alloys, including type 300 and 400 series stainless steels, N-155, Inconel and Hastelloy C. . . . **Every size and type collet** offered industry is stated to be listed in 26-page Catalog 18 being distributed by Sutton Tool Co., Sturgis, Mich. Twelve pages are given to specifications and prices of collets, feeders, and pads for automatics, hand machines, turret lathes, milling machines, production and engine lathes.

Vibration, a vibration analysis and dynamic balancing instrument, is described in folder being sent out by International Research & Development Corp., Columbus, Ohio. . . . **Complete line of drill presses** made by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., is described and illustrated in Catalog 5206.

Aircraft seamless tube applications and specifications are included in folder being distributed by Ohio Seamless Tube Co., Shelby, Ohio. . . . **Miniature and octal-size thermal time relays** of the hermetically sealed adjustable type are described in Publication 30, which also provides cutaway views. Write G-V Controls, Inc., 28 Hollywood Plaza, East Orange, N. J. . . . **GE Instrument Transformer Buyer's Guide**, 1953 edition, contains basic information on General Electric Co.'s entire line, including ratings, ASA accuracy classifications and prices. Ask for Publication GEA-4626F at Schenectady 5, N. Y.



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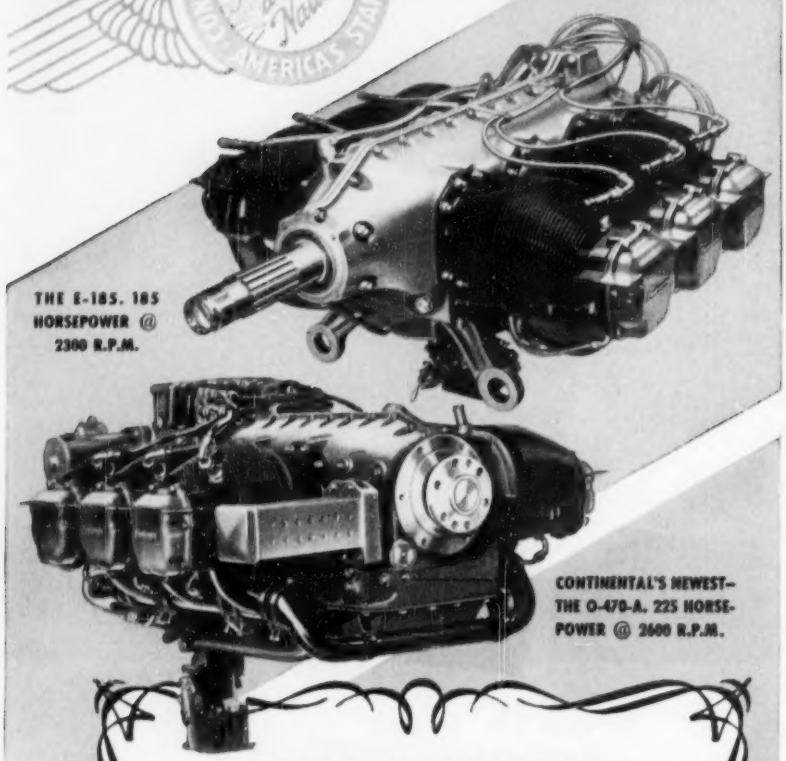

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Third Survey of Research Projects dealing with aviation safety is a 109-page compilation of safety research activities cataloged and cross-referenced according to the Institute of the Aeronautical Sciences' engineering index system. Copies are available from Daniel and Florence Guggenheim Safety Center, Cornell University, 2 E. 64th St., New York 21, N. Y. Price $1.

ASTM Standards on Light Metals and Alloys, sponsored by Committee B-7 of American Society for Testing Materials provides numerous specs and tests issued by the society through March 1953. Copies of the 216-page publication may be obtained from ASTM, 1916 Race St., Philadelphia 3, Pa. Price $3.

Final Approach and Landing is a condensed record of discussions held during the Fifth International Air Transport Assn. meeting at Copenhagen in May 1952. The publication contains factual data and views given by experts of airlines, governments, manufacturers, research centers and international organizations at the sessions. Copies may be obtained from IATA's head office at the International Aviation Bldg., Montreal, P. Q., Canada. Price is $1.50. Orders from sterling areas should be directed to Manager, IATA Clearing House, 30 Curzon St., London W. 1, England.

Meteorology for Pilots is a correspondence course offered by Compass Point Aviation, 20 Morel Circle, Greenwood, Mass. A proving run of the course was made on nearly 100 Northeast Airlines pilots co-pilots and dispatchers, the firm states. Price is $75.

Publications Received

- **Tall Timber Pilots,** by Dale White & Larry Florek, published by The Viking Press Inc., 18 E. 48th St., New York 17, N. Y., 1953, $3.50. The story of the Johnson Flying Service in Missoula, Mont., which was started in 1924 by Bob Johnson.
- **The Army Air Forces in World War II—Volume V-The Pacific,** edited by W. F. Craven and J. L. Cate, published by The University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill., 1953, $8.50. This volume completes the narrative of combat operations of the AAF in World War II.
- **Aircraft Propulsion Theory and Performance,** by A. W. Morley, published by Longmans, Green and Co., Inc., 55 Fifth Ave., New York 3, N. Y., 1953, $5.50. The important systems of aircraft propulsion are surveyed in this introductory textbook for engineering and science students.

(Transport Section starts on p. 84)

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RA-8085, Aviation Week
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RW-8115, Aviation Week
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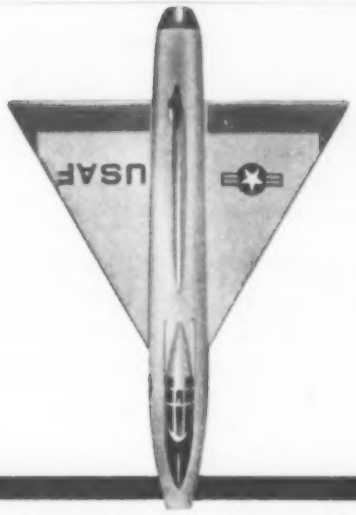

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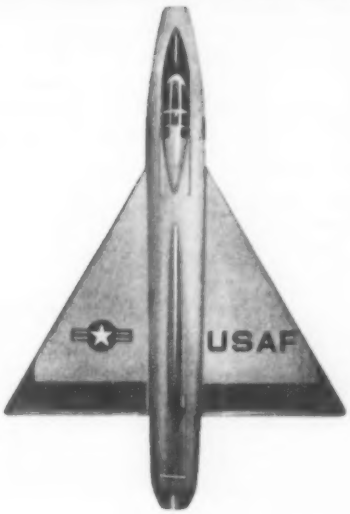

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19	15100-1B-A1	Eclipse	Pitch Trim Gauge
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67	23000-2A	Eclipse	Magnesyn Indicator
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6	2226-11C-3A	Eclipse	Dual Tach.
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9	20000-8A-14	Eclipse	Magnesyn Pos. Ind.
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11	DW-33	Eclipse	Transformer
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28	47B23	Lewis	Air Temp. Gauge
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19	117-10	Edison	Control Box
200	981280	Kidde	CO2 Cylinders
43	966090	Kidde	Interconnector
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225	981591	Kidde	Tee
151	A-4614	Kidde	Switch
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74	923748	Kidde	Oxygen Cyl.
325	982585	Kidde	Valve
325	AN60009-1B	Oh. Chem.	Valve
247	AN6009-2A	Oh. Chem.	Valve
47	2-1046-76	Parker	Valve (3000 PSI)
115	P4CA2A	Parker	Primer
68	SP4-2746-77	Parker	Restrictor Valve
105	SP4-2746-78	Parker	Restrictor Valve
68	6-746-10	Parker	Valve
40	SP4-2746-79	Parker	Restrictor Valve
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125	D7818	Adel	Anti-icer Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
45	AN4103-2	Clifford	Brass (Valve #U4785) Oil Cooler
70	AN3213-1	Scintilla	Ignition Switch
250	A-9 (94-3226)	Nesco	Ignition Switch
66	M862A	Jos. Pollack	Master Switch
148	PG208AS1	Honeywell	Switch Air Ram.
40	PG208AS7	Honeywell	Air Ram Switch
18	4582-AA-6C	Dynamic Air Eng.	Blower
24	U-709-15	Joy Mfg. Co.	Blower
20	V30187	Aerotec	Pressure Relief Valve
419	450	Skinner	Filter
287	1033-4E1	White-Rodgers	Heater Control Switch
126	17322-2	Fenwall	Thermo Switch
34	9804B	Vapor Car Heating Co.	Control Box
25	46B311	Vapor Car Heating Co.	Compensator
202	A812	Interstate Aircraft & Eng. Co.	Solenoid
46	146102	Bendix	Valve (0-500 PSI)
240	1265-900	Airex	Relief Valve
29	HC2109	Air Associates	Hyd. Cylinder
8	HC2110	Air Associates	Hyd. Cylinder
53	AN6203-3	Bendix	Accumulator10"-1500 P.S.I.
90	JH950-R	Jack & Heinz	Starter Motor
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Coleman	Control
230	921-B	Stewart-Warner	Heater (200000 BTU)
22	0655-D	Aro	Oxygen Regulator
65	ASDC2	CO2 Mfg. Co.	Fire Detector
97	6041-H-146A	Cutler Hammer	Relay (B-12)
237	6141-H69A	Cutler Hammer	Circuit Breaker
47	7264-404	Leach	Relay
22	M-2031	Air Associates	Actuator
11	FYLD2516	Barber-Coleman	Thermostat
51	AYLZ2284	Barber-Colemen	Micropositioner
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52	715E	Fulton Syphon	Temp. Control
478	D9530	Adel	Selector Valve
668	D9530-2	Adel	Selector Valve
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60	AN5831-1	Parker	Valve
130	612-4A	Eclipse	Valve
2200	37D6210 (AN4078-1)	United	Solenoid Valve
1888	K1593-6D	Kohler	Valve
500	NF3-5	Mallory	Noise Filter
20	TA-12B	Bendix Radio	Transmitter
35	RA10-DB	Bendix Radio	Receiver
2585	AN3096-4	Grimes	Dome Light
775	AN3096-5	Grimes	Dome Light
1365	AN3096-6	Grimes	Dome Light
6	610-2C	Eclipse	Vacuum Pump
550	PD12K10	Stromberg	Carburetor
236	PR48-A1	Stromberg	Carburetor
90	1685-HAR	Holley	Carburetor
19	1375F	Holley	Carburetor
407	SF9-LN-2	Scintilla	Magneto
185000	LS4-AD1	Aero	Spark Plug
1	R1820-52	Wright	Engine
16	R1820-54	Wright	Engine
4	R1820-60	Wright	Engine
1	R1830-43	P & W	Engine
166	1045A	P & W	Bearing
500	3506	P & W	Flange
130	8288	P & W	Follower Ass'y.
814	35814	P & W	Blower Ass'y.
53	48362	P & W	Shaft
75	48363	P & W	Shaft
56	48392	P & W	Sump
390	48461	P & W	Gear
78	76236	P & W	Gear
1178	84289	P & W	Bearing
113	84487	P & W	Housing
77	84591C	P & W	Nose Housing
200	48350-D	P & W	Crankcase Ass'y.
200	84083	P & W	Cylinder
100	84084	P & W	Cylinder
200	84085	P & W	Cylinder
281	CR2791-G100-K4	G.E.	Relay
626	CR2792F101-A3	G.E.	Relay
41	G34464	Guardian	Relay
350	G31502-A	Guardian	Relay
22	146102	Vickers	Brake Valve
9	557-5	Eclipse	Check Valve
107	D12296	Adel	Pump
67	19100-2-101B	Kenyon	Check Valve
88	3135-11C	Eclipse	Pressure Switch
32	3V-217-HC	Pesco	Separator
100	27314	Purolator	Oil Filter
128	3801-3B	Eclipse	Fuel Quan. Gauge
33	420313	Wright Aero	Pump Ass'y.
46	416421	Wright Aero	Drive Ass'y.
76	U635A (AN4000-2B)	U.A.P.	Fuel Strainer
12	U8416-MM	U.A.P.	Oil Cooler Ass'y.
25	26675	Airesearch	Motor
35	AA14002A	Vickers	Accumulator
21	FD65-5	Diehl	Motor
81	3616	Bendix Radio	Control
23	3620	Bendix Radio	Station Box
335	G1 (94-32376)	G.E.	Oxygen Pressure Signal Ass'y.
180	AW-CV-1-1	U.S. Gauge	Check Valve
740	1C-200	G.E.	Radio Noise Filter
15	1EAR-2808H	Pesco	Pump
7	SP-1-445-8	Parker	Selector Valve
8	1E621	Pesco	Pump
29	NEP-2	Eclipse	Auxiliary Power Unit
16	LER-30D	Lawrence	Auxiliary Power Unit
4	2CM46A2	G.E.	Generator
6	2P248EB	Pesco	Fuel Pump
21	2E258SA	Pesco	Pump
146	AW2-3/4-25K	U. S. Gauge	Manifold Press Gauge (Metric)
27363	CREB3N	Casco	Rod End
18	SA/3A	Kidd	Impact Switch
13	3GBD1A18A	G.E.	Regulator
18273	AN200-K3L2	Fafnir	Bearing
245	LMR-4	Micro	Switch
2094	PM-5	Spencer	Circuit Breaker
44	5BA25D-J4B	G.E.	Motor
31	5AM31JJ9A	G.E.	Amplidyne
111	5AM31NJ10	G.E.	Amplidyne
425	5BA40NJ1A	G.E.	Motor
189	5PD65-MB1	G.E.	Motor
25790	NR6L12	Torrington	Bearing
26	MS49A	Bendix Radio	Antenna Switch
45	D2060	C. P. Clare	Relay
298	727-TY37P	Weston	Air Temp. Ind.
2000	8909-K99	C. H.	Switch
2747	NAF310310-4B	Cannon	Plug
402	NAF310310-5B	Cannon	Plug
132	AN6209-8	Hydro Aire	Valve
50	AN6213-2	Bendix	Hyd. Valve
280	AN6220-4	Aeroquip	Couplings
27	AN6247-2	Adel	Hyd. Valve
14	UA8013-MM	United Aircraft Prod.	Oil Cooler
1175	RS-2	Mallory	Selector Box
172	A7012	Delco	Motor
6	8DJ13ABK	G.E.	Tachometer Indicator
200	2222-1F-2A	Eclipse	Tachometer Indicator
28	AN5770-2	Manning Maxwell Moore	Manifold Pressure Gauge
71	1003-4	Eclipse	Generator
427	NAF1016-1	Adams & Westlake	Light Ass'y.
616	NAF1016-2	Adams & Westlake	Light Ass'y.
1008	1222BF	Leach	Relay
751	B1392T	Teleflex	Gear Box
130	B1394T	Teleflex	Gear Box

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SEARCHLIGHT SECTION

Administration Plan:

CAB to Take Over Airmail Subsidies

- **Re-organized setup is step on way for Post Office to negotiate service rates directly with airlines.**
- **Carriers oppose grant of rate-fixing powers to PO; plan meeting this week to study counter proposals.**

By Lee Moore

Postmaster General Arthur Summerfield last week cleared the first major hurdle in his program to cut mail rates and expand mail service by air carrier.

President Eisenhower sent to Congress a re-organization plan shifting the $80-million airline subsidy appropriation from the budget of the Post Office Department to that of Civil Aeronautics Board, which actually has been committing the government to pay the subsidies since 1938.

The transfer becomes law in 60 days, barring a veto by a majority of the entire House or Senate. The President said the plan would take effect 45 days after it becomes a law.

Subsidies probably will swell the CAB budget from $3 million to $83 million.

▶ **Low Mail Rates**—The subsidy transfer clears the way for Summerfield to ask Congress later for authority to negotiate low mail rates direct with the airlines, instead of paying whatever CAB directs (AVIATION WEEK May 25, p. 17).

Even if the Post Office does not win freedom to contract mail tonnage like air express and freight, the threat probably will speed airline and CAB agreement on some changes in compensatory air mail rates.

The President's initial airmail subsidy re-organization calls for:

• **No subsidy cut.** Mr. Eisenhower said in his letter of transmittal that the plan "will not alter the basic national policy of promoting sound development of air transportation through federal aid." He added, "Nor will the plan itself change the aggregate amount of revenue for which any airline is eligible."

• **Quick action.** The President said: "In the interest of prompt effectuation, the plan contains an interim provision which authorizes the Board to establish without prior notice of hearing the initial rates to be paid by the Post Office . . ."

• **Use of present CAB rates.** The President said CAB can set rates immediately under the new program, because the Board already has worked out the change for all carriers.

• **End to congressional delay.** Mr. Eisenhower noted that the subsidy separation principle started in 1949, but most bills went beyond simple separation of budget and thereby become so controversial as to fail. He said: "In view of the general agreement on the principle of subsidy separation, I trust that this plan will have widespread support."

• **Change of rates later.** The plan provides that after initial beginning on non-subsidy rates already arranged by CAB, hearings will enable CAB, Post Office and airlines to propose, argue for and settle on new mail rates.

▶ **More to Come**—The President said he recommended that Congress proceed with supplemental legislation to amend the Civil Aeronautics Act, improving mail and subsidy economy "to effect refinements and modifications in the basic law in this field."

He urged Congress to change the Civil Aeronautics Act "to provide specifically that compensatory rates for mail transportation should be based upon the cost of rendering mail service, plus a fair return." He noted that "CAB already uses the cost standard," but added: "I believe it would be appropriate to establish the cost principle as a matter of definite legislative law."

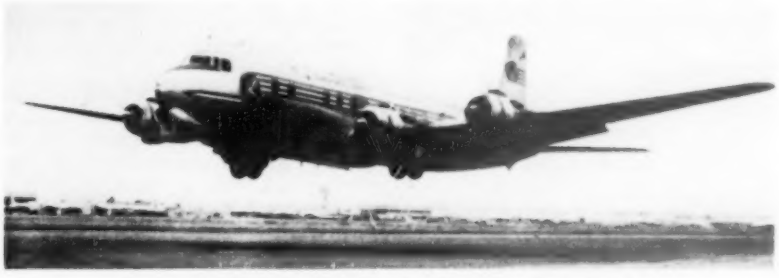
Airlines prefer a more nebulous "value of service" principle of fixing airmail pay, but CAB rejected it in the Big Four mail rate case in 1951. Air carriers still oppose the cost method, however, and asked the White House not to include "cost" as a definite standard within the actual re-organization plan. The President urged Congress to act with separate legislation.

▶ **Negotiated Mail Rates**—Next step is an Administration bill proposing Post Office power to negotiate new mail rates. Although the President's re-organization does not change total subsidy and airmail pay immediately, it does prepare the way for what he calls a "sounder basis for the administration and congressional review of the affected functions."

This means the Postmaster General gets a freer hand to reform mail rates set by CAB. Summerfield recently told Congress he soon will ask legislation permitting him to bypass CAB authority over non-subsidy mail rates and negotiate directly with the carriers. Post Office already negotiates individual rates with the railroads under authority of the Transportation Act of 1940.

Post Office executives term "impossible" the current section of Civil Aeronautics Act requiring the department to pay rates over which it has no control.

Airlines have told Assistant Post-



LOS ANGELES-PARIS NONSTOP VIA DC-6B

Douglas DC-6B recently delivered to French airline Transports Aeriens Intercontinentaux tucks its landing gear up after taking off from Los Angeles International Airport, Calif. on its way to Paris where it landed 20 hr. 28 min. later. The DC-6B, second of three TAI is getting, carried a crew of five plus three Douglas technicians and made the 4,938-nautical-mile nonstop flight at an average speed of approximately 278 mph. with little aid from winds. Extra fuel tanks brought the total to approximately 6,700 gal.

master General-Transportation John Allen that they will fight the proposal for direct negotiation of mail rates. The carriers plan to get together this week to thrash out some counter-proposals of their own.

What they are seeking is some way to give the Post Office the rate reforms it wants without giving it rate-fixing authority.

▶**Post Office Plans**—The Post Office wants less red tape, lower airmail pay and a more flexible rate structure. For example, the present CAB mail rates take no account of lower unit cost on bulk shipments. So there is little incentive for Post Office to consolidate loads for bulk shipments at lower cost to the carrier.

New Post Office executives say they probably would ship a lot of surface mail by air if they could get reasonable rates.

This would expand the volume of airlines' mail business.

Post Office officials also want the right to select the best carrier service and the lowest rate.

Chinese Communists Expand Air Service

(McGraw-Hill World News)

Expansion of air transport activities is being pushed by the Chinese Communist government, monitored Soviet broadcasts say.

A new airline has been inaugurated between Peking and Chungking via Siam by the Sino-Soviet Aviation Corp., according to recent Communist broadcasts.

Chungking-bound planes leave Peking every Tuesday and Saturday with departures from Chungking on Mondays and Fridays. At Siam, the new service links other Sino-Soviet flights which have been operating in northwest China.

Another new route is scheduled to be opened July 1 from Urumchi to Koshih in southern Sinkiang. Chinese and Soviet officials have been touring Sinkiang selecting suitable airfield sites for the new route.

The Sino-Soviet Aviation Corp. has reduced passenger and freight rates on its main Chinese trunk route, Urumchi-Lanchow-Peking, to encourage "economic and cultural exchange between northwest China and other parts of the country."

Although actual fares have not been announced, rate reductions of 12% have been made on the Lanchow-Urumchi run, according to broadcasts, and up to 39% between Lanchow and Peking. Passenger rates for the entire Urumchi-Peking flight are down 17.2% the Communists say.

Nonsked Tries Rear-Facing Seats

North American Airlines reports passenger response to new safety innovation is surprisingly enthusiastic.

By William J. Coughlin

Burbank, Calif.—North American Airlines last week became the first U. S. commercial airline to install rear-facing seats on a regular flight.

A North American DC-4 equipped with 80 seats facing aft began transcontinental coach service between Los Angeles and New York May 31.

Passenger response to the unusual ride was surprisingly enthusiastic.

If the trial proves successful during a four-month test, North American's four other DC-4s and two DC-6Bs on order will be equipped with the rear-facing seats, president Jack Lewin says.

Passenger enthusiasm over the rear-facing seats on the nonsked airline surprised critics who expected the public to complain about the safety innovation.

▶**Unexpected Advantages**—In addition to increased safety and visibility, passenger comments turned up some unexpected advantages. Several felt the arrangement was responsible for reducing nausea. North American reports that despite a turbulent flight, fewer passengers became airsick than usual.

Another unexpected advantage was discovered in the comment of a passenger who reported: "I like seats facing the rear because you have a better view of the stewardess."

"Acceptance was even greater than we had hoped for," Lewin says. "We are convinced. We will continue the trial until October and, if response remains the same, we will equip all our aircraft with the rear seats."

Of 66 passengers who responded to the airline's request for written comment on the new arrangement, 59 responded favorably, five were noncommittal and only two gave unfavorable answers.

Designed by North American, the seats were built by Burns Aero Seat Co. of Burbank and were installed by Flying Tiger Lines, which handles NAA's maintenance.

▶**Head Protection**—Cost for the 80 rear-facing seats was $15,000, compared to $11,000 for the same number of ordinary coach seats. Stressed in the back as well as the legs, the seats have been tested at loads of 9Gs. To provide head protection in event of accident, the seats are taller than North American's regular coach seating.

Backs fold forward for access to escape hatches.

"Statistics show most passenger fatalities result from broken necks or head injuries which render the passenger unconscious," Lewin says. "We are definitely convinced the rear-facing seats will prevent that type of injury in most crashes. Safety is greatly increased in any crash where the seats do not tear loose from the floor. If they do, of course, it makes little difference which way the passengers are facing."

▶**CAA Aid**—Lewin says North American and Burns began research on the aft-facing seats more than a year ago, and an order was placed three months ago. Civil Aeronautics Administration's Burbank office worked with the airline on the project, and two CAA officials were aboard the first test flight.

Lewin says studies were made of results obtained with rear-facing seats on European airlines and U. S. military aircraft.

Two DC-6Bs on order from Douglas for delivery in the fall of 1954 have been planned from inception for air-coach travel with seats facing aft, according to Lewin.

▶**Passenger Response**—North American invited passenger comment on the initial flights with a letter, which read in part:

"We have reversed the seats in this airplane on a trial basis for your greater comfort and safety. Facing to the rear enables much greater visibility to most rows as the wing does not obstruct visibility. These seats are considerably stronger than regular seats. Facing the

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A novel feature of Los Angeles International Airport is the $3.5-million Sepulveda Boulevard underpass tunneling under the big field. The vehicular subway eliminates a tedious bypass for 50,000 motorists daily and permits extension of the main east-west runway to 12,500 ft.

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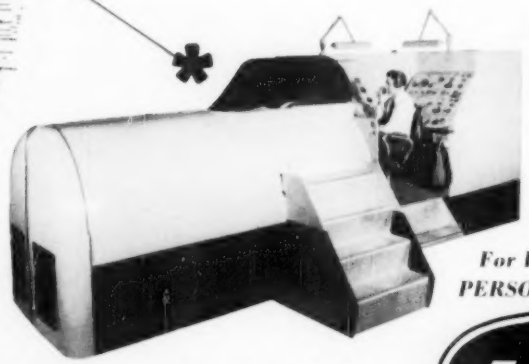

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rear has been scientifically proven to be much safer in event of a jar or sudden stop. . . . We do hope that your being asked to ride facing the rear meets with your pleasure. We will appreciate your favoring us with your comments below."

Typical passenger comment:

- **"I found that** a seat facing the rear was more comfortable at takeoff and during the entire trip. I recommend the change highly."
- **"Definite increase in comfort** . . . in reclining position, much less tendency towards nausea . . . much easier takeoff, too. . . . However, while seats are wide enough, they are a trifle too close to those in front."
- **"Gives me an extra feeling of safety."**
- **"Absolutely horrible.** Very difficult to see ahead and get the vicarious thrill of landing the plane. Much less privacy. . . . You have the feeling the hostess is watching you. It's also unnatural—or at least seems so after years and years of riding the other way in cars, buses and other planes."
- **"This seating arrangement** meets with my hearty approval. It seems a more sensible, convenient mode. One is able to enjoy a better, longer view. The bumpy passage in rough weather is easier than in forward seating. Sleeping is apparently easier."
- **"Facing to the rear** does not have any adverse affect on my enjoyment of air travel. Thus the safety factor would, I think, outweigh any objection a person could offer against its adoption."
- **"The hostess is wonderful.** The airplane seat contraption stinks."

West Coast Final Mail Pay: $1,614,528

West Coast Airlines final mail pay of $1,614,528, including an estimated profit of $92,296 a year, has been proposed by Civil Aeronautics Board effective from last Aug. 1, date of merger with Empire Air Lines.

Effective rate will be about 51.47 cents a plane-mile at forecast passenger load factor of 29%.

CAB says it probably will not cover recent expenses of the integration period but that ultimate economies of the merger should produce more than the estimated $92,000 annual profit.

The new estimated mail pay is $394,129 more than West Coast reported for the 12 months up to date of merger. The Board points out that the consolidated system increases mileage by 26%. Old rate was 46.41 cents a mile. Carrier had asked an increase to 60 cents a mile starting next Aug. 1, but CAB rejected it.

New rate is estimated to cover $52,000 true compensation for hauling airmail and $1,562,528 straight subsidy.

SWA Flies 2-0-2s

Southwest Airways last week started flying 40-passenger Martin 2-0-2s despite the Civil Aeronautics Board refusal of extra subsidy for the big plane (AVIATION WEEK June 1, p. 81).

First Southwest route to get the service is San Francisco to Medford, Ore. Southwest serves 31 West Coast towns on a 1,153-mi. route system stretching from Los Angeles to Medford.

Seattle-Houston Interchange Approved

Direct Seattle-Houston service via United-Braniff one-plane interchange is recommended for Civil Aeronautics Board approval by examiner Joseph Fitzmaurice.

Only airline to oppose the service is Western, claiming it would divert $181,000 a year from connecting routes WAL offers to cities on the proposed interchange.

The UAL-Braniff interchange would be Seattle/Portland, Salt Lake City, Denver, Colorado Springs, Oklahoma City, Dallas/Ft. Worth, Houston. It would replace their present connecting service at Denver. The CAB examiner says any other interchange routing between the Pacific Northwest and central Texas would be 15% to 30% more circuitous.

Tourists Boost PAA Hawaii Service

An 81% gain over 1952 in travel from the West Coast to Hawaii during the four months ending May 1 has been credited by Pan American World Airways in a large measure to low-cost tourist service inaugurated last December.

PAA highlighted the impact of tourist travel on its total operations in its 1953 first quarter report to stockholders.

President Juan T. Trippe says commercial revenues during this period were $35,826,749, an 8% increase over the first quarter of last year. Revenue passenger miles totaled 416,184,000, a 12% increase; and revenue ton-miles were 59,950,000, up 5% over last year's similar period. Cargo ton-miles, however, showed an 11% decrease to 11,907,000.

COPTER MEANS BUSINESS

This seven-passenger Sikorsky S-55 is used by Rockwell Mfg. Co. executives to coordinate activities of the firm's main office in Pittsburgh, Pa., and seven plants within an approximate 200-mi. radius. These plants are located in small, often isolated communities, and use of commercial air or rail transportation formerly cost hundreds of executive manhours yearly. Rockwell personnel now can take off at a heliport only three-minutes walk from the main office and visit as many as three plants a day, landing at adjacent parking lots. The copter also has proved valuable in transporting vitally needed components when emergencies arise. Photo left shows W. F. Rockwell, Jr., president of the firm, using the intercom phone to talk to the S-55's pilot.

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Comet Gains

- **BOAC chairman says jet economy is improving.**
- **Report cites advantages over piston transports.**

British Overseas Airways Corp. reports its Comet 1 jet liners are improving rapidly in economy after making a profit in the first year of operation (AVIATION WEEK May 11, p. 17).

In a survey of the first 12-month period of jet transport flight on a scheduled airline, Sir Miles Thomas, BOAC chairman, says:

• **Performance** is easier analyzed and predicted for a given set of conditions than that of piston types.

• **Weather delays** do not cause dangerous or too-wasteful fuel consumption waiting over airports. When weather is bad on the Rome-London flight, the dispatcher can hold Comets on the ground until it starts clearing. The jet's speed generally enables it to complete a flight before weather trend reverses.

• **Fuel-burning taxi** to takeoff is held to a minimum by starting engines only after clearance from traffic control. Jets require no warmup or full-throttle check.

• **Engine-out climb** with full load "leaves an ample margin of safety and is much superior to that of a comparable piston engine aircraft."

• **Cruising economy** is best achieved by holding a pre-selected indicated airspeed, altered every half hour as weight decreases. This results in a gradual climb. Cruising altitude varies from 35,000 to 42,000 ft.

• **Navigation** problems are not changed by jet transports, but must be figured faster. "The most important requirement is the continued development of static-free homing and distance-measuring equipment. Astro-navigation is simplified by relatively cloud-free vista of Comet's high-altitude operation, but time-consuming calculations use up some of this advantage.

• **600-hr. engine overhaul** "is now imminent." If distance covered in this time is compared with the 1,000-hr. overhaul period of a piston engine, jet powerplants already cover more ground between overhauls.

• **Daily utilization** started a year ago at three hours, of which only one was revenue-earning. Total is up to six and a half hours. Utilization time is an unfair statistical comparison for the jet. Its hours of utilization per day cannot equal the piston plane, because time on the ground cannot be reduced as much as the jet's airspeed cuts time in the air.

• **Mechanical delays** have been reduced to 9% of average journey time, compared with 40% the first month of operation.

▶ **Mechanical Improvement**—Sir Miles points out that bugs shown up in the Comet's first year have been overcome rapidly. Here are examples he cites:

• Foggy windshield showed up last June "without any previous warning" on approach to Beirut and Khartoum, due to temperature and humidity. Increased flow of warm air across inner face of the glass solved the problem.

• Weak windshield wiper developed in service, despite most careful pre-flight testing. Hydraulic drive strengthened the wiper.

• De-icing system showed some maldistribution of hot air, but reducting fixed it. Jet spends so little time in icing areas that this was not a major problem.

• Compressor blade cracks turned up at inspection and were traced to high-frequency vibration. Slight trimming of impeller blades shifted the frequency nodes outside the critical range.

▶ **Maintenance Record**—Sir Miles says "it must be admitted that" these modifications increased the man-hours required beyond the original estimate. But, he says, the average maintenance manhours for a "major Check 4 routine inspection" still are "lower than for the best of the four-engine piston aircraft in the BOAC fleet." Original estimate of 2,500 manhours will be achieved.

• Engine failures average 0.73 per 1,000 hr., of flying, "which in itself compares favorably with BOAC's piston engines."

• Ghost engine time between overhauls soon will improve from 450 to 600 hr., with flame tube inspections at 200 hr.

• Modified flame components soon will improve time for tube inspection to 300 hr.

Some BOAC Ghost engines are approaching 2,000 hr. operating time.

▶ **Weather**—Of weather conditions encountered by Comets, Sir Miles says cumulo-nimbus cloud formations in the tropics are higher than was at first believed. Towers sometimes rise higher than 40,000 ft., but "the tops of these clouds do not contain the severe turbulence" and "being isolated, are easily avoided." Cloud detection radar already under development "may be the answer."

Clear-air gusts have "not borne out previous forebodings." Such gusts are encountered, but "their effect has been aptly likened to passing over a short section of cobblestone road in a fast car."

▶ **Profit Operation**—BOAC's chairman does not reveal detailed financial records of the Comet operation—investment, expense, taxes, revenue. But he says, the revenue from its 75-80% load factor yielded "sufficient profit during the

Talk on Jets

Civil Aeronautics Administration's Turbine Transport Committee was scheduled to visit Curtiss-Wright Corp. at Wood-Ridge, N. J., last week for a discussion of jet powerplant planning in relation to the future U.S. transport program.

The committee, headed by George E. Haldeman, chief of CAA aircraft engineering will follow this visit with one to Pratt & Whitney Aircraft, East Hartford, Conn., and a third to confer with Air Line Pilots Assn. safety and engineering representatives at Chicago. Visits to several military bases, and NACA laboratories also are on the committee's itinerary within the next few weeks.

Plans still call for the CAA group to visit England at the end of August to renew discussions with British Air Registration Board representatives on U.S. certification of the forthcoming de Havilland Comet 3 for Pan American World Airways.

period to cover the interest on the capital expenditure."

Sir Miles adds that this is only the first stage of Comet development. The high-revenue load factors will continue to bolster Comet income, he says, because "there will be no other jet airlines during this time to challenge their monopoly of the travelling public's preference."

CAB ORDERS

Pan American World Airways and its affiliate, Aeropuertos Unidos, S.A., interline agreements with National Airlines et al approved. May 27. Order No. E7416.

Trans-Texas Airways authorized to suspend service temporarily at Magnolia, Ark., until airport is made suitable. May 27. E7415.

Investigation of tariff liability rules of airlines divided into separate dockets. Airline protective rules on acceptance of ill and pregnant passengers and 90-day limit on filing suit for injury are set down for a separate hearing. May 27. E7414.

Seaboard & Western Airlines denied exemption to accept low-bid contract to fly refugees Brussels-New York for intergovernmental Committee for European Migration. May 27. E7413.

West Coast Airlines final mail rate $1,614,528 proposed—(see p. 87). May 26. E7412.

Complainants Mary Batista et al vs. Continental Charters denied petition for rehearing to show that CAB should have dismissed the company tariff requiring early

Great Airlines from Little Airlines grow

and become GREAT assets to the commercial and military might of our Nation!

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It was then that Harris "Pop" Hanshue, founder of Western Express, began flying mail from Los Angeles to Salt Lake City in Douglas biplanes. Others, with 'independent' airlines carrying only passengers and freight without mail pay, included Jack Frye's Standard Airlines operating one eight-passenger Fokker, Los Angeles, Phoenix and Tucson, and Jack Maddux' Maddux Airlines with Ford trimotors flying San Francisco, Los Angeles, San Diego and Tijuana. The parental foursome came into being in 1929 when Transcontinental Air Transport, the Lindbergh Line, was founded. And in the same year surviving companies were merged to form Transcontinental and Western Air, with Pittsburgh Aviation Industries Corporation retaining five per cent of the stock. During those days with low-wing Northrop mail planes, TWA sped the mail across the country in 24 hours!

Today, fifty years after the famous Wright Brothers' first flight, Trans World Airlines flights are 'called' daily in 21 world centers abroad, including London, Paris, Rome, Bombay, as well as 60 U. S. cities.

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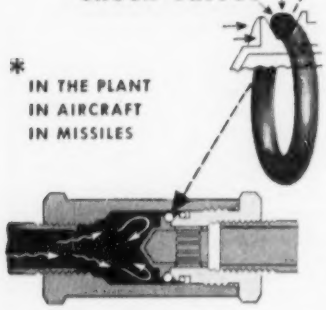

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notice of suit for passenger death or injury. CAB says since it already has ruled the tariff was unlawful, complainants are fully relieved of the problem of the airline's unlawful restriction. May 26. E7411.

States-Alaska carriers' agreement with Air Transport Assn. approved, arranging standby airlift machinery for the territory in emergencies. May 26. E7410.

Purdue University granted year extension of permit to operate two DC-3s up to 1,000 hr. per year each. May 26. E7409.

Jugeslovenski Aerotransport, Lake Central Airlines and other carriers' interline traffic agreements and transactions approved. May 25. E7405.

Pan American and other carriers' International Air Transport Assn. agreements relieved of necessity of filing copies of all IATA data with CAB when the Board waives this requirement "for such period as it deems proper." May 25. E7407.

Colonial Airlines granted permission to start service on its certificated routes to Lancaster and Philadelphia on or about June 9. May 25. E7406.

Interlocking relationships of Paul Gross, Jr., et al with Railway Express Agency approved. May 22. E7405.

Seaboard & Western Airlines granted exemption to fly refugees Stockholm-New York May 27 because only Seaboard's bid met the flight date specifications of Intergovernmental Committee for European Migration. May 22. E7404.

Riddle Aviation docket applying for authorization to carry passengers between Miami and certain Caribbean and Central America points dismissed on request of Riddle, except insofar as previously granted. May 22. E7403.

Lake Central temporary mail rate increase to $1,331,450 needed to break even proposed by CAB for the period starting Apr. 1, when new routes went into operation. May 21. E7402.

Southwest Airways show-cause order proposing $1,042,919 annual mail pay (Aviation Week June 1, p. 81).

Air Line Pilots Assn. granted leave to intervene in Flying Tiger-Slick merger case. May 21. E7400.

Trans-Texas route segments renewal with consolidation of separate segments.

Braniff Airways deferred until after oral argument in the reopened Midwest certificate renewal case on its recent motion to hold up procedural steps pending rehearing of evidence including: proposal that local carrier instead of Braniff give additional service proposed by examiner and take over BNF's existing service to Sioux Falls, Huron, etc. May 21. E7398.

U. S. Airlines denied exemption to haul cargo Miami-Atlanta via Tampa and Orlando because certificate does not permit it, and Delta, and Eastern Air Lines object. CAB previously denied a U. S. request for substantially similar certificate amendment. May 21. E7397.

Frontier Airlines application to serve Williston, N. D., consolidated with a CAB investigation proposing similar Braniff service. May 20. E7396.

Northwest Airlines and Pacific Northern Airlines tariffs proposing seating reduction to 50 passengers on DC-4 coach service Anchorage-U. S. Suspended and put under investigation by CAB on grounds that it would be about the same as first-class service at lower rate without adequately increased payload capacity. May 19. E7395.

SHORTLINES

► **Air France** has added service Stuttgart and Nurnberg, Germany.

► **American Airlines** has started one-stop Cleveland-Los Angeles afternoon service.

► **Baca Airlines**, Jefferson City, Mo., has taken over two other small operators: C. C. A. Airlines, operating from St. Louis to Memphis, and M. A. S. Airlines, operating St. Louis-Evansville. Scheduled unduplicated route mileage goes up from 264 to 954. Equipment is boosted to 16 single-engine planes, available flight crews 12 and total employes 32. Unsubsidized Baca will fly 48 scheduled flights covering 5,592 mi. per day. The carrier is expected to file application soon for CAB approval of the merger as it involves interstate traffic.

► **British Overseas Airways** has added Dusseldorf, Germany, to its new London-Beirut Aircoach. . . . Company carried 27,700 paying passengers 104 million passenger-miles during its first year of scheduled jet Comet service.

► **Capital Airlines** has awarded a $500 bond and title of "man of the year" on Jose A. Deang, a CAP instrument mechanic, who invented, designed and built seven major pieces of testing equipment and numerous minor ones for Capital.

► **Colonial Airlines** starts north-south service connecting Philadelphia with upstate New York June 9.

► **De Havilland** jet Comet 2 with Rolls Royce Avon engines flew Hatfield, England-Cairo, Egypt, averaging 476 mph. for the trip of 4 hr., 35 min.—beating Comet 1 record by half an hour.

► **Flying Tiger Line** reports record air freight traffic for April, reversing normal seasonal downtrend. Freight revenues of $597,876 were 41% more than a year ago.

► **International Air Transport Assn.** reports interline traffic transactions for the first quarter of this year at $50,386,000, compared with $46,015,000 a year ago. March total was $17,659,000; it was $15,377,000 same month in 1952.

► **Italian Airlines** summer trans-Atlantic

schedule provides two aircoach and one firstclass flight per week.

► **International Civil Aviation Organization** council set up a committee of nine European countries to develop an agenda and program for a conference on coordination of Europe's air transportation.

► **Lockheed Aircraft Service-International** has started construction of its new $3-million base at Idlewild Airport, New York.

► **North Central Airlines** schedules will increase 20% to 14,321 miles per day this week. . . . Company soon will commission its 15th DC-3.

► **Northwest Airlines** reports 68,387,001 scheduled revenue passenger-miles flown in April, up 13% from a year ago. Load factor is 61%, compared with 65% April, 1952.

► **Oakland Airport** has opened a new military terminal to handle troop and other air movements.

► **Panagra** last week planned to switch from DC-3s to DC-4s on its Lima-Quito-Panama route.

► **Pan American World Airways** increased its aircoach service to Hawaiian Islands by 50% June 1, making nine flights per week.

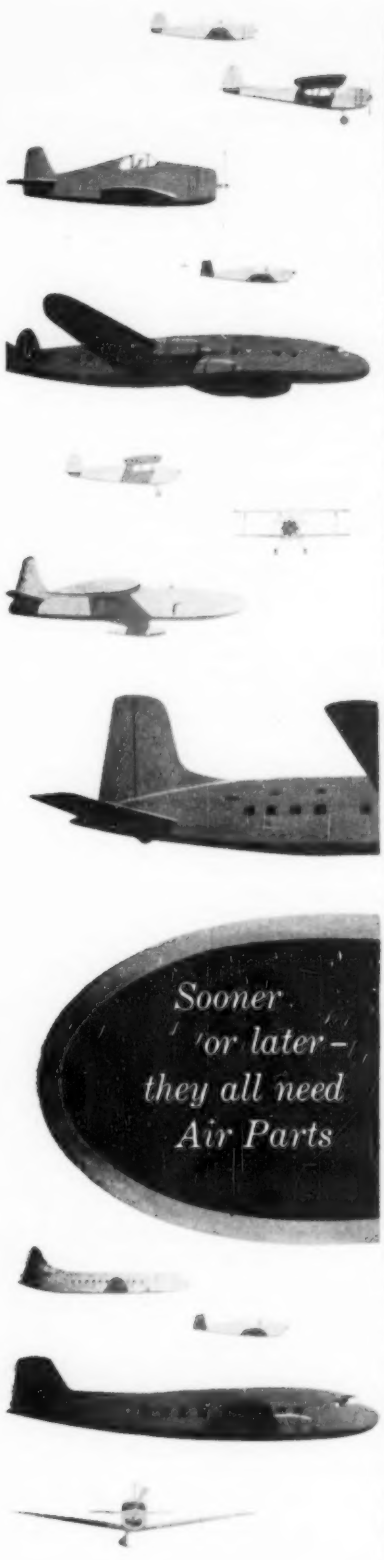
► **Resort Airlines** reports it has won lifting of restrictions on British landing rights on the islands of Nassau, Jamaica, Trinidad and Antigua.

► **Riddle Airlines** acquisition by a group of Miamians headed by B. W. Turner will bring a new board of directors composed of New York, Miami and Puerto Rico businessmen. J. G. Helvey, executive vice president and general manager, succeeds John P. Riddle as president.

► **Sabena** Belgian Airlines has set up $2,000 prize for a young artist and research worker alternately each year. This is to mark Sabena's 30th anniversary. The 1953 prize will be for a sculpture.

► **Slick Airways** has added its fourth DC-6A to transcontinental airfreight schedules. Each transport lifts 30,000 lb. at 300 mph. . . . Slick says it carries more freight than any other line and operates more than double the air cargo schedules of any other carrier out of New York.

► **Seaboard & Western** reports April operations up 15% from a year ago to reach a total of 653,063 revenue plane-miles.



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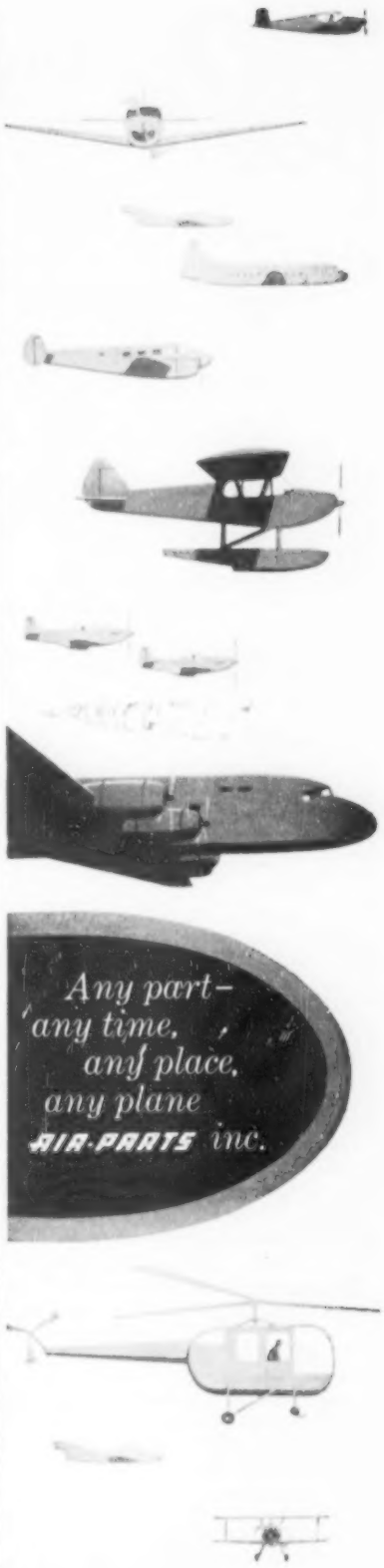

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SO THEY TELL US

(Special sidelight reports sent by AVIATION WEEK *full-time staff members here and abroad after they had talked with several scores of aviation leaders in preparing today's issue.)*

Military

Tokyo—Tech orders are in short supply in Korea. One wing converting to new aircraft reported more than a month after the conversion that only 5% of the necessary tech orders had been received.

Seoul—Air Force now plans to make permanent the changes in its tactical wing structure forced by the Korean war. This means abandoning the idea of a wing as a self-sufficient unit and adoption of the system in use in Korea under which wings contribute maintenance personnel to rear echelon maintenance bases in Japan. Belief is that moving heavy maintenance out of immediate combat zone to joint bases in the rear cuts possible disruption by enemy air attack. Another reason is difficulty of maintaining complex equipment under forward area conditions.

Los Angeles—It's no secret that Col. Francis Gabreski—an advocate of jitney fighters—strongly disagrees with the lightweight fighter article in Collier's written by Gen. Doolittle. Gabreski won't take a public stand against it because of Doolittle's rank.

Tokyo—Some Air Force officers queried here believe U.S. all-weather interceptors should be modified so the black boxes can be removed—for both weight and security reasons—and the aircraft used for another purpose, such as a fighter-bomber. This, they feel, would increase utilization of an aircraft during periods when it is not needed as an interceptor.

Hollywood—They're working on a war movie here, to be called "Sabre Jet," with technical advice coming from returned Korean flyers stationed at Nellis AFB, Las Vegas. Air Force also is supplying the planes and pilots for the flying scenes. Despite the expert advice, you wonder at use of F-86s as day fighters on one day and fighter-bombers the next, or you may ponder how Sabres fighting in northwest Korea operate out of Japan bases.

Civil Aeronautics Board

Washington—Close congressional friends of CAB member **Harmar Denny** (a one-term congressman) had a tough time convincing him not to ask for the CAB chairmanship this year. He asked for, and got, the vice chairmanship. **Oswald Ryan** (Republican) kept the chairmanship conferred on him by Truman just after last November's election. . . . **Chan Gurney** was bitterly disappointed by Ryan's redesignation, and by Denny's appointment. Gurney, 12 years a South Dakota senator, and an ex-chairman of the House Armed Services Committee that worked with Eisenhower, among others, on the unification act during the 80th Congress, did not seek the chair but expected the President to confer it on him. Gurney's friends say. . . . CAB observers say member Denny has misinterpreted the apparent party split of the other four CAB members on competition and fare level policy issues. Republicans Ryan and Gurney have tended to shy from approving much new competition and have favored airline requests for higher fares, while Democrats **Josh Lee** and **Joseph Adams** have advocated more airline competition and consideration of lower fares, from time to time. Yet all four are Roosevelt or Truman appointees. And Congress set up CAB along usual quasi-judicial commission lines with the aim of bi-partisanship in voting—and platforms of both parties fail to reveal any specific issues bearing on CAB policy. Most observers consider it a coincidence that the Board members are split as they are along party lines, but some have worked the coincidence to their advantage by giving Denny the feeling it is a party split. There is the feeling here that this influenced his reversal on the passenger fare investigation, his first important case. He voted first with Lee and Adams to continue it, then switched to Ryan's and Gurney's side to dismiss. Next test is the **Wiggins Airways** certificate renewal reconsideration. The same split among members prevailed on the original argument last fall. . . . Few people know that CAB chairman Ryan's only direct foray into professional politics was in 1926, when he ran unsuccessfully for U.S. senator from Indiana in a statewide Republican primary, with **Booth Tarkington** as his campaign manager. Ryan says the Ku Klux Klan defeated him. He was general counsel of the Federal Power Commission when Roosevelt named him among the original five CAB members in 1938.

AVIATION CALENDAR

June 9-11—Second International Aviation Trade Show, Hotel Statler, New York.

June 11-13—Fifth annual All-Women International Air Race, Welland, Ont., to New Smyrna Beach, Fla., sponsored by Ninety-Nines, Inc.

June 16—Seventh session of the assembly of the International Civil Aviation Organization, Brighton, England. Session is expected to last three to four weeks.

June 16-19—Spring technical meeting of the American Welding Society, Shamrock Hotel, Houston.

June 17-19—Mid-year meeting of Aviation Distributors and Manufacturers Assn., Chateau Lake Louise, Alberta, Canada.

June 19-21—Pennsylvania State Wing convention of the Air Force Assn., Hotel Roosevelt, Pittsburgh.

June 22-July 3—Special summer program presenting a formalized theory for analysis and synthesis of feedback control systems and classes July 6-17 in advanced strength of materials, Massachusetts Institute of Technology, Cambridge.

June 29-July 2—Semi-annual meeting, American Society of Mechanical Engineers, Hotel Statler, Los Angeles.

July 1-3—Annual meeting of University Aviation Assn., National College of Education, Evanston, Ill.

July 3-7—Seventh All-Women Transcontinental Air Race from Lawrence, Mass., to Long Beach, Calif.

July 4-5—Dedication of Coles County Airport, Mattoon, Ill.

July 9-12—Sixth International Aviation Exposition, Detroit-Wayne Major Airport.

July 15-16—IAS Annual Summer Meeting, Honors Dinner, IAS Building, Los Angeles, Calif.

Aug. 2—Amarillo, Tex., Jaycee Air Fair, observance of 50th anniversary of powered flight, Tradewind Airport.

Aug. 3-8—Fourth annual congress, International Astronautical Federation, Zurich.

Aug. 19-21—Western Electronic Show and Convention, San Francisco.

Aug. 19-24—Seventh International Model Plane Contest, sponsored by Plymouth Motor Corp., Selfridge AFB and Belle Isle, Detroit.

Aug. 25—Opening of the ninth legal committee meeting, International Civil Aviation Organization, Rio de Janerio.

Sept. 5-7—National Aircraft Show and 50th anniversary of powered flight, Dayton (Ohio) Municipal Airport.

Sept. 7-17—Fourth International Aeronautical Conference, joint meeting of RAeS and IAS, London.,

Sept. 21-25—Eighth, National Instrument Exhibit, Instrument Society of America, Sherman Hotel, Chicago.

Sept. 28-30—Ninth annual meeting, National Electronics Conference, Hotel Sherman, Chicago.

Sept. 30-Oct. 1—Aircraft electric equipment conference, American Institute of Electrical Engineers, Seattle.

Oct. 8-9—New England section meeting, Society of the Plastics Industry, Inc., Equinox House, Manchester, Vt.

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PENTAGON STATEMENT ON REVISED AIR BUDGET

(Because of the importance of the Eisenhower Administration's proposed budget slashes in air power for the fiscal year 1954, AVIATION WEEK publishes the full text of an official statement handed to Pentagon reporters May 29. It was prepared in the office of W. J. McNeil, Assistant Secretary of Defense, to interpret the new program and was attributed to the Office of the Secretary of Defense.)

IMPACT OF THE REVISED 1954 BUDGET ON AIR PROGRAMS FISCAL 1954 AND 1955 SCHEDULES

The following references to air wings are in terms of "modern aircraft," which means with respect to combat planes that piston engine power will be used only in B-36s and B-50s. In transports, all C-47s and C-54s are now obsolescent, and when we say modern transports here it means C-124s, C-119s, C-97s or similar types.

For June 1954, the new budget will produce 114 Air Force wings; under the Truman budget, while 133 were scheduled, the best estimate is that only 117 wings would probably have been attained. This included 17 troop carrier wings, whereas the new budget only includes 12, thus giving it a higher percentage of combat types.

Moreover, under the new budget we are scheduled to have in 1954 modern aircraft for seven Air National Guard and Air Reserve wings. Under the Truman budget no modernization was contemplated for civilian components.

As for June 1955, the new budget will maintain 120 wings; under the Truman budget, 137 modern wings were scheduled for this time. However, this included 17 troop carrier wings whereas the new budget includes only 14. Moreover, the Air National Guard and Air Reserve in the new budget are expected to have about 23 wings equipped with modern, first-line aircraft. No modernization for civilian components was contemplated under the Truman budget.

Air Force combat aircraft scheduled for delivery in the period 1 July 1953–31 December 1955 are increased by at least 75 aircraft in the budget submitted by President Eisenhower in May, as compared with the January budget of the previous Administration. This is almost enough aircraft to equip a modern fighter wing. Adjustments have been made in support-type aircraft, which includes trainers, transports, helicopters, and liaison aircraft, resulting in a reduction of about 1,150. This has resulted from changes in requirements, elimination of duplication and elimination of procurement of special mission aircraft (for VIPs).

As for Navy and Marine air arms, there will be no reduction in 1954 or 1955 in combat units. With a total of 9,941 operating aircraft, they will maintain 16 carrier groups, 15 ASW squadrons, 34 patrol squadrons, and 3 Marine wings. They will absorb a reduction in total aircraft amounting to roughly 200 in 1954 and about 500 in 1955. These will be taken out of support units. Modernization will continue but will be slowed down by 100 aircraft in 1954 and 300 in 1955. However, Navy will still be receiving more than 3,000 new, modern aircraft a year.

SUMMARY

Not a combat plane for combat units that we want will be taken out of production in fiscal 1954 or fiscal 1955 due to lack of money. In fact, the number of combat planes scheduled for delivery to the Air Force in the 30-month period ending December 1955 will be higher than in the Truman budget. Such production cuts as occur will be primarily in support types (transports, trainers, helicopters, etc.) as a result of changes in requirements, elimination of duplication, and elimination of procurement of special mission (VIP) aircraft.

AIR DEFENSE OF THE UNITED STATES

As to air defense, there is no change expected in the number of interceptor wings in the new budget. There is no reduction either in the budgeting for radar net in either year. Under both the new budget and the Truman budget, the same number of anti-aircraft battalions are scheduled for both years, with modernization progressing as guided missiles and new equipment become available.

FINANCING AIRCRAFT PROCUREMENT LEAD TIME

Programs will be adjusted to reflect more realistic lead times. At the present time, for example, a relatively simple trainer aircraft is programmed for the same lead time as a medium jet bomber.

Aircraft lead time can be adjusted to 18 months or less, which will result in lower unit costs. By reducing the lead times, the contractor's backlog can be reduced, and with it his inventory of parts and components, without piling up unnecessary stocks. Money can be saved here since the government must pay for maintaining this inventory.

Briefly, the budget savings can be summarized as follows:

(1) Reducing lead time and thus reducing the need for as much forward financing;

(2) Reductions in forward financing which can be made due to slippages in production schedules;

(3) Reductions in forward financing of aircraft models not yet ready for quantity production, many of which were intended to replace aircraft which have not yet been produced;

(4) Elimination, to the maximum extent possible, of production peaks and valleys in the aircraft industry, thus avoiding the feast and famine condition which has existed in the industry for years; and

(5) Reducing cost of additional bases and cadres required by regular forces by placing more reliance on modern civilian components which for the most part have operating facilities available.

EXAMPLES OF PRODUCTION SLIPPAGES

Delivery schedules for selected planes have slipped to the extent shown below:

B-52—4 months.
B-57—6 months.
F-84F—4 months.
T-36—8 months.

By adjusting the program to these facts, requirements for new financing can be reduced and still absorb production as it comes along.

SAVINGS IN LEAD TIME

The following lead times are reflected in the Truman budget:

B-47—26 months.
F-100—25 months.
F-101—26 months.
T-33—23 months.

These are much too long, particularly on items that have long been in production like the B-47 and T-33. He believes lead time on the B-47 and most of the others can be cut to 18 months.

FISCAL SUMMARY—DEPARTMENT OF DEFENSE (BILLIONS OF DOLLARS)

	Unexpended carryover 30 Jun 53	New request for FY 1954	Total available in FY 1954	Probable expenditures in FY 1954	Unexpended carryover 30 Jun 54
Army	17.0	13.7	30.7	16.5	13.2
Navy	16.8	9.7	26.5	11.0	14.2
Air Force	28.5	11.7	40.2	15.1	24.9
Interdepartmental	0.3	1.0	1.3	0.6	0.6
Total	62.6(A)	36.1	98.7	43.2	52.9(B)

(A) Approximately $6 billion of this amount will be unobligated. This unobligated balance, when added to the $36-billion new request, will make $42 billion available for obligation subsequent to 1 July 1953.

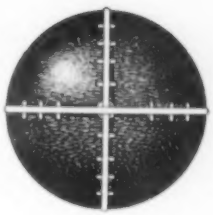
(B) After deducting $2.6 billion expected to lapse and revert to the Treasury at the end of fiscal 1954.

AIRCRAFT DELIVERIES TO DEPARTMENT OF DEFENSE (EXCLUDING MDAP)

Under aircraft procurement planned in the revised fiscal 1954 budget, the Air Force is scheduled to receive over 2,300 more aircraft from production in fiscal 1954 than during fiscal 1953. The Navy is scheduled to receive over 800 more aircraft in fiscal 1954 than during fiscal 1953.

1956 PICTURE AS COMPARED TO PROGRAM UNDER TRUMAN BUDGET

Under the Truman budget, by 1956 there were scheduled 143 wings, although based on past experience the goal might not have been met. As far as present considerations are concerned, the Air Force has been told to plan on 120 until there has been an opportunity to review the requirements by the Joint Chiefs, Security Council and President. Results of this review cannot be predicted —there could be 143, 150 or 110 wings, depending on what the review turns up.



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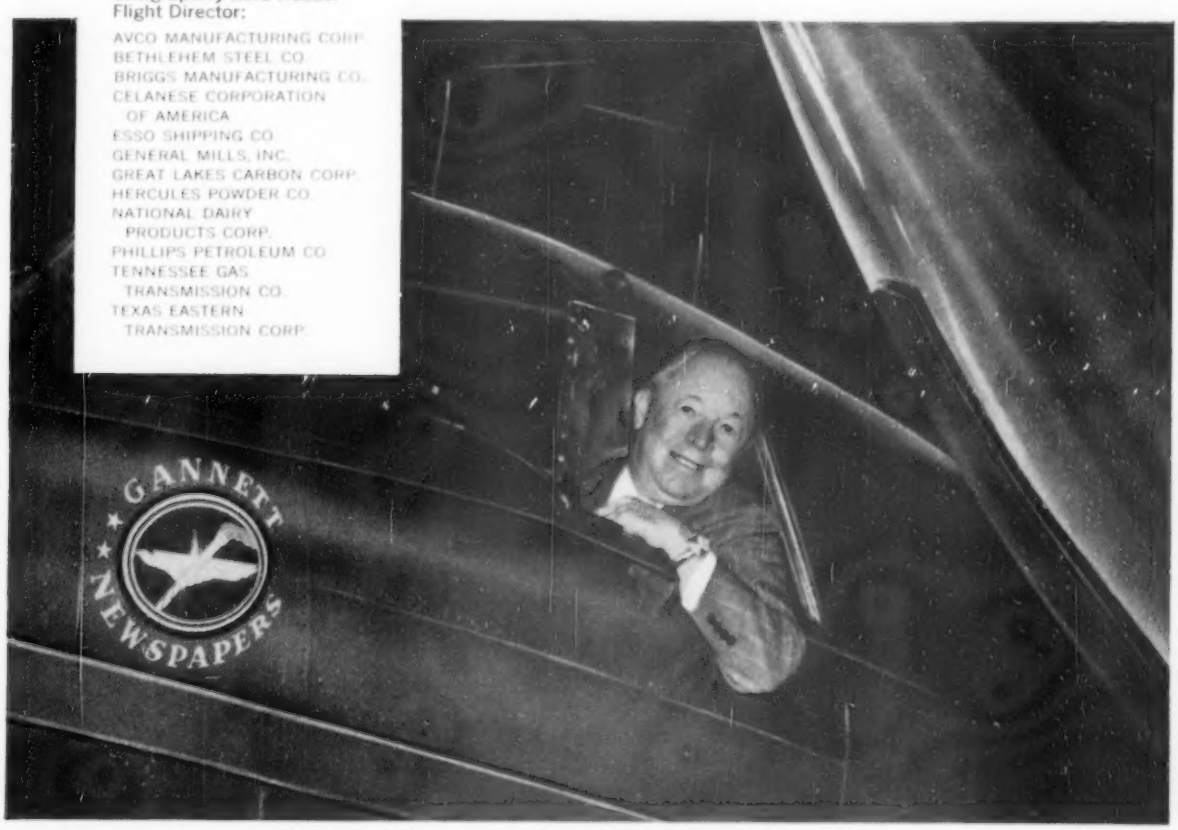

Cmdr. Russell Holderman of the Gannett Newspapers, who is celebrating his 40th year as a pilot, is one of the enthusiastic users of the Sperry Zero Reader Flight Director.

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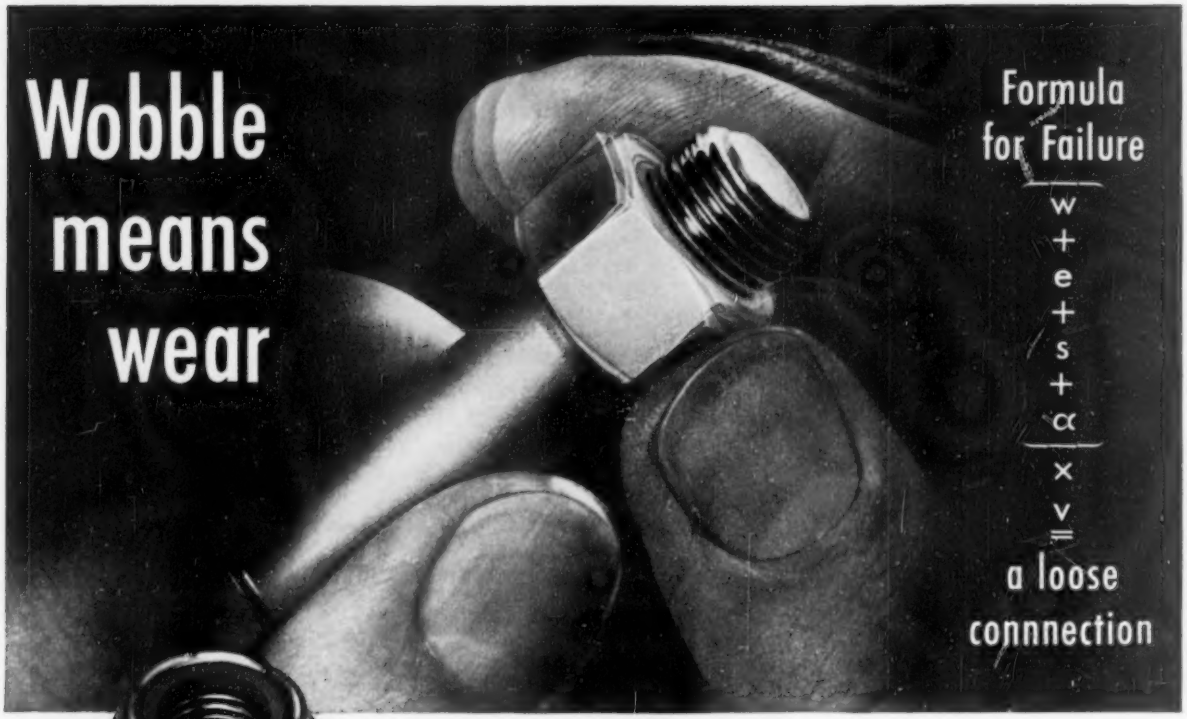

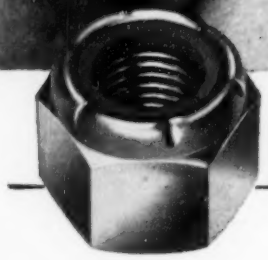

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Formula for Failure—[(w) Initial thread wear + (e) bolt stretch + (s) thermal expansion or contraction + (α) wobble] × (v) vibration = a loose connection.

WOBBLE, permitted by normal axial thread play, and vibration are two of the major elements contributing to thread wear, loose connections and ultimate failure of a threaded fastener.

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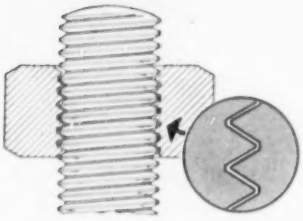

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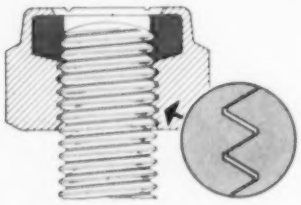

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